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Sorghum Bibliography 1983

Compiled by

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PREFACE

This bibliography is the sixth in the series of sorghum bibliographies compiled and published by the Sorghum and Millets Information Center (SMIC). The bibliography includes literature published during 1983 and is annotated. The annotations are generally based on the author's abstract or summary. In some cases, abstracts have been prepared specially for this bibliography.

The sources used in compiling this bibliography, are 600 primary periodicals received at ICRISAT, and secondary sources such as the abstracting journals of the CAB, Biological Abstracts, Bibliography of Agriculture, Agrindex, Dissertation Abstracts International, Indian Science Abstracts, etc. In addition, the bibliography also includes items of literature generated within ICRISAT, and non-conventional literature that SMIC collects from its contacts with research centers, libraries and documentation centers in India, Africa, and Latin America. Computer output from data bases such as the AGRIS, AGRICOLA, BIOSIS, Science Citation Index, has also been monitored in identifying entries for the bibliography.

Entries are arranged by broad subject groups indicated in the table of contents. Within each subject group, entries are arranged in alphabetical order by authors. Titles in languages other than English have been translated into English and AGRIS abbreviations have been used to designate languages other than English. The titles of periodicals are cited in full. However, only the acronyms of well known organizations have been used rather than their names in full. A list of acronyms is included in the preliminary pages of the bibliography.

The bibliography has an author and a subject index. The subject index is based on a technique called Pragmatic Approach to Subject Indexing (PASI) developed at SMIC. A guide to the subject index is provided in the preliminary pages of the bibliography.

All components of this bibliography have been produced on the VAX-11/780 computer system using software developed at SMIC. The software integrates data entry, editing, sorting, production of indexes, and formatting required for the production of a bibliography. The programs have been written by P.K. Sinha of SMIC.

The collection, compilation and editing work for the bibliography has been done by S. Prasannalakshmi, Nalini Basavaraj and P.K. Sinha. The data-entry for the bibliography was done by R. Laxmipathi. The overall responsibility for the bibliography including its computerisation has been that of P.K. Sinha.

The publication of the bibliography has been made possible by the financial assistance received from the International Development Research Centre (IDRC) for the SMIC Project.

L J Haravu
Manager
Library and Documentation
Services
ICRISAT

GUIDE TO SUBJECT INDEX

The computer produced subject index is based on the Pragmatic Approach to Subject Indexing (PASI) system developed at SMIC. The original sequences of the keywords provided by the indexer are the logical entries and convey subject content of documents unambiguously. Other entries are generated by rotating the logical entries to enable access from all the keywords. Thus for the title "Effect of nitrogen and phosphorus fertilizers on the growth of Sorghum sudanense" (Document No. 198) , the logical index entry is-

```
Sorghum sudanense,
  Growth,Nitrogen fertilizers:Phosphorus
   fertilizers,Effect                    0198
```

The entries obtained by the rotation of keywords are:

```
Nitrogen fertilizers:Phosphorus fertilizers,
  Effect;Sorghum sudanense,Growth,       0198

Phosphorus fertilizers:Nitrogen fertilizers,
  Effect;Sorghum sudanense,Growth,       0198
```

The cross reference entries through nitrogen and phosphorus fertilizers are:

```
Fertilizers see also,
  Nitrogen fertilizers
  Phosphorus fertilizers
```

It is always possible to rebuild the logical entry from any entry if keywords are read starting from the first keyword after the semicolon in an anti-clockwise direction.

Certain keywords are considered in combination because of the close relationship existing between them. The symbols used to depict the relationships are colon (:), slash (/), and parentheses. The (,) acts as a separator between the keywords.

Common and botanical names have been used in the subject index. The choice of keywords has largely been made using the AGROVOC and CAB thesauri. Cross references have been provided wherever required.

LIST OF ACRONYMS

AICSIP	All India Coordinated Sorghum Improvement Project
ASAE	American Society of Agricultural Engineers
BARC	Bhabha Atomic Research Centre
CAB	Commonwealth Agricultural Bureaux
CIAT	Centro Internacional de Agricultura Tropical
CILSS	Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo
CMI	Commonwealth Mycological Institute
CNRA	Centre National de Recherches Agronomiques
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária
FAO	Food and Agriculture Organization of the United Nations
IANR	Institute of Agriculture and Natural Resources
IBPGR	International Board for Plant Genetic Resources
ICAR	Indian Council of Agricultural Research
ICARDA	International Center for Agricultural Research in Dry Areas
IDRC	International Development Research Centre
IICA	Instituto Interamericano de Ciencias Agrícolas
INIA	Instituto Nacional de Investigaciones Agrícolas
IRAT	Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières
IRRI	International Rice Research Institute
ISRA	Institut Sénégalais de Recherche Agricole
OECD	Organization for Economic Cooperation and Development

PKV	Punjabrao Krishi Vidyapeeth
SIDA	Swedish International Development Authority

LANGUAGE CODES USED IN ENTRIES

Af	Afrikaans	It	Italian
Al	Albanian	Ja	Japanese
Ar	Arabic	Ko	Korean
Bg	Bulgarian	Nl	Dutch
Ch	Chinese	Pe	Persian
Cz	Czech	Pl	Polish
Da	Danish	Pt	Portuguese
De	German	Ro	Romanian
En	English	Ru	Russian
Es	Spanish	Sh	Serbo-Croat
Fr	French	Sk	Slovak
Ge	Georgian	Sn	Slovenian
He	Hebrew	Sv	Swedish
Hu	Hungarian	Tr	Turkish
In	Indonesian	Uk	Ukrainian

BIBLIOGRAPHY

0001 NAIDU, R.G. 1983. Sorghum bibliography 1974-76. Patancheru, Andhra Pradesh, India: ICRISAT, SMIC. 200 pp.

The bibliography contains 3119 references and includes author, subject and geographic indexes.

GENERAL

0002 BASKIN, C.C. 1983. Grain sorghum: variety selection and planting. Information Sheet, Mississippi State University, Cooperative Extension Service no. 1224. 2 pp.

Suggestions for selection of varieties for yield increase and disease and insect resistance and planting are given to the growers of sorghum in Mississippi, USA.

0003 BEDIGIAN, D., and HARLAN, J.R. 1983. Nuba agriculture and ethnobotany with particular reference to sesame and sorghum. Economic Botany 37(4): 384-395. 21 ref.

There is a remarkably high level of variation within cultivated sesame and sorghum in the Nuba Mountains of Sudan although the region is relatively small. The Nuba people are geographically isolated and culturally diverse in religion, language, material inventory, agricultural practices and in their rituals involving crop plants, and this contributes to the diversity in their cultivars. Nuba crop husbandry is sophisticated and high levels of genetic diversity are maintained by deliberate selection of crop varieties that are well adapted to each of the microenvironments of the region and best suited for different economic uses.

0004 BOTSWANA:DEPARTMENT OF AGRICULTURAL RESEARCH. 1983. Annual report for the Division of Arable Crops Research 1981-1982. Sebele, Botswana: Ministry of Agriculture. 195 pp. 25 ref.

The report includes the information on varietal and agronomic trials of crops including sorghum.

0005 BRAZIL:EMPRESA BRASILEIRA DE PESQUISA AGROPECUARIA. 1983. Sorghum. (Pt). Pages 81-84 In EMBRAPA 10th year: from research results of 1982. Brazil: Empresa Brasileira de Pesquisa Agropecuaria.

0006 BRAZIL:PESQUISA AGROPECUARIA NO ESTADO DO RIO DE JANEIRO. 1983. Report of activities 1983. (Pt). Niteroi, RJ, Brazil: Pesquisa Agropecuaria no Estado do Rio De Janeiro. 52 pp.

This report includes results of research on sorghum in Brazil.

0007 DELEMME, F. 1983. Sorghum deserves to be developed. (Fr). Jeunes Agriculteurs 360: 32-33.

0008 FAGI, A.M., and DE DATTA, S.K. 1983. Physical properties of rainfed wetland rice soils as affected by cropping system and crop residue. Field Crops Research 6(3): 189-204. 27 ref.

Effect of crop residues of sorghum and cowpea on wet land rice soils is studied in a field experiment at IRRI, Philippines.

0009 GERARD, C.J., SEXTON, P., CLARK, L.E., and GILMORE,

E.C., JR. 1983. Sorghum for grain: production strategies in the rolling plains. Bulletin, Texas Agricultural Experiment Station no. 1428. 12 pp.

0010 GUIARD, L., LESAGE, R., and DIERAERT, P. 1983. Wheat project in Burkina Faso: Di station (Sourou) [Sorghum, extension activities]. Ouagadougou, Burkina Faso: Autorite des Amenagements des Vallees des Voltas. 116 pp.

0011 HAGBERG, A. 1983. ICRISAT - plant breeding and farming systems for the semi-arid tropics and their poor population of small farmers. (Sv). Sveriges Utsaedesfoerenings Tidskrift 93(2): 93-110. (Summary:En).

0012 HASHI, M. 1983. Sorghum improvement in Somalia. Pages 25-29 In Crop Improvement in Eastern and Southern Africa: Research Objectives and On-farm Testing: a Regional Workshop, 20-22 July 1983, Nairobi, Kenya (Kirkby, R.A., ed.). Ottawa, Canada: IDRC.

Information on cultivation methods, utilization, breeding, and research on sorghum in Somalia is given.

0013 ICRISAT. 1983. A decade of research and training on sorghum and pearl millet at ICRISAT, 1973-1982. Patancheru, Andhra Pradesh, India: ICRISAT. 27 pp.

This report summarizes the major achievements in research and training for the development of lines and varieties of sorghum and millets with high yield and nutritive value and suitability for use in the semi-arid tropics, utilizing a multidisciplinary, coordinated approach involving breeders, physiologists, pathologists, entomologists, microbiologists, and biochemists. Training was provided at the inservice technical levels, to research fellows studying for M.Sc's and Ph.D.'s, and at the post-doctoral level.

0014 ICRISAT. 1983. International cooperation. Pages 335-396 In Annual report 1982. Patancheru, Andhra Pradesh, India: ICRISAT.

Information on international cooperation between ICRISAT and Burkina Faso, Mali, Niger, Nigeria, Senegal, Sudan, eastern and southern Africa, Latin America and ICARDA, Syria, for sorghum and other mandate crops improvement and training program of the institute is included in this chapter.

0015 ICRISAT. 1983. Sorghum. Pages 17-62 In Annual report 1982. Patancheru, Andhra Pradesh, India: ICRISAT.

Information on insect pests, diseases, physical environment, nitrogen fixation, food quality, population improvement, cooperative multilocational testing and future research plans is presented. A list of publications of the institute and of its scientists on sorghum is also provided in this chapter.

0016 INDIA:ALL INDIA COORDINATED SORGHUM IMPROVEMENT PROJECT. 1983. Progress report, 1982-83. New Delhi, India: Indian Council of Agricultural Research.

Research report on breeding, agronomy, entomology and pathology of sorghum and on forage sorghum is presented.

0017 INDIA:MAHATMA PHULE AGRICULTURAL UNIVERSITY. 1983. Jowar. Pages 16-24 In Annual report 1982-83. Rahuri, Maharashtra, India: Mahatma Phule Agricultural University.

This report covers the results of research on breeding, agronomy, soils and farming systems, pests and diseases of kharif sorghum and rabi sorghum.

0018 INDIA:MARATHWADA AGRICULTURAL UNIVERSITY, SORGHUM RESEARCH STATION. 1983. Research highlights. Parbhani, Maharashtra, India: Marathwada Agricultural University.

Research highlights on breeding, physiology, agronomy, entomolgy, pathology of grain sorghum and technology and development of promising varieties of forage sorghum are given.

0019 IRAT, BURKINA FASO. 1983. Summary report (1982) for Upper Volta. (Fr). Ouagadougou, Burkina Faso: IRAT. 208 pp.

The report includes information on sorghum research.

0020 IRAT, FRANCE. 1983. Sorghum. (Fr). Pages 63-83 In Rapport annuel 1982. Paris, France: IRAT.

0021 JADHAV, S.N., KALRA, G.B., and WAGH, V.B. 1983. Hybrid jowar an alternative to ragi in Konkan region. Indian Farming 33(3): 26-27.

Field experiments were conducted at Maharashtra, India to examine the performance of finger millet and sorghum during kharif seasons of 1977-1979. Hybrid sorghum CSH5 performed better than finger millet.

0022 JESSOP, R.S., and STEWART, L.W. 1983. Effects of crop residues [sorghum], soil type and temperature on emergence and early growth of wheat. Plant and Soil 74(1): 101-109. 14 ref.

0023 KRENZER, E.G., FIKE, W.T., VAN DUYN, J.W., LEWIS, W.M., and DUNCAN, H. 1983. Grain sorghum production in North Carolina. AG, North Carolina State University, Agricultural Extension Service no. 318. 8 pp.

Recommendations for the cultivation, insect, disease and weed management, harvesting, and processing of sorghum in North Carolina are given.

0024 LAMBERTINI, F. 1983. Sorghum cultivation in Italy. (It). Informatore Zootecnico 30(3): 32-34.

0025 LANZA, F. 1983. Possibilities and limits of the crop. (It). Informatore Agrario 39(11): 24981-24982, 24985-24988.

Intensive croppng, irrigation and genetic improvement of sorghum and maize cv. in Italy are described.

0026 MAITI, R.K., GONZALEZ, H.R., ALANIS, L.C.O., and CIVERA, M.A. 1983. Some aspects of crop establishment in sorghum in Marin, N.L. [Mexico]. (Es). Presented at the Workshop on Production and Quality of Sorghum, 26-29 September 1983, Irapuato, GTO., Mexico. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0027 MALI:MINISTERE DE L'AGRICULTURE, SECTION DE RECHERCHES SUR LES CULTURES VIVRIERES ET OLEAGINEUSES. 1983. 1982-1983 (season) results synthesis and 1983-1984 programmes [sorghum, millets, wheat, sugar-cane, groundnut, research, breeding and protection in Mali]. (Fr). Bamako, Mali: Ministere de l'Agriculture, Section de Recherches sur les Cultures Vivrieres et Oleagineuses. 121 pp.

0028 MALI:MINISTERE DE L'AGRICULTURE, SECTION DE RECHERCHES SUR LES CULTURES

VIVRIERES ET OLEAGINEUSES. 1983. Programme of agrophysiological research: millets and sorghums: season 1982-1983 [Mali]. (Fr). Bamako, Mali: Institut d'Economie Rurale. 10 pp.

0029 MARIANI, G., and DONATELLI, M. 1983. Grain sorghum: biological, agronomic and breeding aspects. (It). Informatore Agrario 39(11): 24991-24998. 45 ref. (Summary:En).

The most important aspects of the biology and physiology of sorghum are considered in relation to adaptation and agrotechnical problems. Among characteristics of hybrids, maturity and tannin content are evaluated. The requirements for genetic improvement and hybrid sorghum seed production in Italy are also considered.

0030 PACHECO LEON, R. 1983. Grain sorghum: an up-to-date technological diffusion (Argentina). (Es). Publicacion Tecnica, Estacion Experimental Regional Agropecuaria Anguil (Argentina) no. 27. 79 pp.

0031 PIXLEY S.L., and RODRIGUEZ, C. 1983. Sorghum cultivation in Costa Rica. (Es). 3rd edn. San Jose, Costa Rica: Compania Costarricense del Cafe. 46 pp. 34 ref.

0032 RUIZ-SIFRE, G.V., and RIES, S.K. 1983. Response of crops to sorghum residues. Journal of the American Society for Horticultural Science 108(2): 262-266. 17 ref.

Vegetable and field crops were grown on young residues of several cv. of sorghum in the greenhouse and field. Seedling growth of field corn maize in the greenhouse was increased by residues of sorghum shoots, but not by residues of sorghum roots. In contrast the growth of maize in the field was always decreased by residues of 'Bird-a-Boo' sorghum roots and whole plants. The growth and yield of snap beans in the field was increased or decreased by sorghum residues depending on the sorghum plant part, quantity, cv., and soil environment. Although sorghum residues may stimulate crop growth in some instances, this stimulation was not easily controlled because the optimal range of sorghum residues and soil environment is too narrow and unpredictable.

0033 TASSI, G. 1983. Cultivation of sorghum in the Marche area. (It). Lotta Antiparassitaria 35(1-2): 8-9.

0034 USA:NATIONAL RESEARCH COUNCIL, ADVISORY COMMITTEE ON THE SAHEL. 1983. Agroforestry in the West African Sahel. Washington, D.C., USA: National Academy Press. 86 pp. 46 ref.

The beneficial aspects of growing sorghum and other crops under a park of Acacia albida by Sahelian farmers are discussed.

0035 VOLLMAR, G. 1983. IANR active with International Sorghum/Millet Research Program. Farm, Ranch and Home Quarterly 30(2): 23-24.

ANATOMY AND MORPHOLOGY

0036 EARP, C.F., DOHERTY, C.A., and ROONEY, L.W. 1983. Bright field and fluorescence microscopy of the developing caryopsis of Sorghum bicolor (L.) Moench. Cereal Foods World 28(9): 559. (Abstract).

Three sorghum lines with widely different genetic traits were studied for caryopsis development.

In the two sorghum lines with a pigmented testa, pigmentation occurred in the inner integument of the ovule as early as one day post anthesis. Pigmentation occurred in the ovary wall also as early as one day post anthesis in the variety with the dominant spreader gene (B1-B2-S_).

0037 EARP, C.F., DOHERTY, C.A., and ROONEY, L.W. 1983. Fluorescence microscopy of the pericarp, aleurone layer, and endosperm cell walls of three sorghum cultivars. Cereal Chemistry 60(5): 408-410. 15 ref.

Three sorghum cv. with major genetic differences were selected to study autofluorescence and its sources using fluorescence microscopy and microspectrofluorimetry. The study revealed that small, low molecular weight phenolic compounds could contribute to mold resistance. As many of the phenolic compounds autofluoresce in the blue region, fluorescence is a useful tool in identifying their location, and microspectrofluorimetry can be used to determine levels of the fluorescing compounds.

0038 EARP, C.F., DOHERTY, C.A., FULCHER, R.G., and ROONEY, L.W. 1983. B-glucans in the caryopsis of Sorghum bicolor (L.) Moench. Food Microstructure 2(2): 183-188. 27 ref.

Fluorescence microscopy was used to determine the location of beta-glucans in sorghum. Sections from 3 genetically different sorghum cultivars were stained with Calcofluor or Congo Red, fluorochromes which have been reported to react with beta-glucans. Autofluorescence, indicative of ferulic acid in other cereals, was observed in untreated sections. When stained sections were treated with endo-beta-glucanase, fluorescence was reduced or entirely eliminated in pericarp, aleurone and endosperm cell walls. B-glucans were isolated from the endosperm of 3 sorghum cultivars. When reacted with the two dyes, Calcoflour or Congo Red, precipitates formed immediately, a reaction which is similar to that produced by mixed linkage beta-glucans from other cereals.

0039 GLENNIE, C.W. 1983. Endosperm development in immature sorghum grain. Proceedings of the Electron Microscopy Society of Southern Africa 13: 87-88. 3 ref.

Immature sorghum endosperm was examined by both SEM and TEM from anthesis to time of harvest.

0040 GLENNIE, C.W., HARRIS, J., and LIEBENBERG, N.V.D.W. 1983. Endosperm modifications in germinating sorghum grain. Cereal Chemistry 60(1): 27-31. 26 ref.

Bird-resistant sorghum grain was germinated on moist filter paper at 28 deg C for 12 days, and samples were taken every day for microscopic examination. Endosperm modification began at the endosperm scutellum interface and subsequently moved into the floury endosperm, with slight modification of the peripheral endosperm. The horny endosperm was modified last. The matrix protein began to disappear first, and after it was disrupted, the starch granules and protein bodies were degraded simultaneously. The starch granules were modified by pitting rather than by surface erosion, and their interiors soon became hollow. The aleurone cells did not appear to be active in enzyme production. They were extensively modified during germination and their mineral content was greatly reduced. The cell walls remained visually unchanged after

germination.

0041 MAITI, R.K., MANOHAR, S.K., and RAJU, P.S. 1983. Sorghum anatomy. (Es). Marin, Nuevo Leon, Mexico: Universidad Autonoma de Nuevo Leon. Facultad de Agronomia. 14 pp. 13 ref.

0042 ROONEY, L.W., FAUBION, J.M., and EARP, C.F. 1983. Scanning electron microscopy of cereal grains. Pages 201-239 In New frontiers in food microstructure (Bechtel, D.B., ed.). St. Paul, Minnesota, USA: American Association of Cereal Chemists. 61 ref.

Application of scanning electron microscopy to sorghum, wheat, rye, barley, rice, maize, and pearl millet specimens are reviewed.

0043 SEAGULL, R.S. 1983. Differences in the frequency and disposition of plasmodesmata resulting from root cell elongation. Planta 159(6): 497-504. 11 ref.

Differences in plasmodesmatal organization and frequency between cells with or without wall expansion, were studied in sorghum and other plants. Plasmodesmatal frequency over the cell surface did not decline as a result of wall expansion and cell elongation, indicating that secondary formation of plasmodesmata was a natural process during cell elongation. The increases in frequency and clustering of plasmodesmata indicated that secondary formation may primarily occur in close proximity to pre-existing plasmodesmata.

0044 SEAGULL, R.W. 1983. The role of the cytoskeleton during oriented micro fibril deposition. 1. Elucidation of the possible interaction between micro tubules and cellulose synthetic complexes. Journal of Ultrastructure Research 83(2): 168-175.

A detailed analysis was done in clover, radish, corn, and sorghum. Microtubules of variable lengths were found in all the cells examined. Some grouping of microtubules was observed with inter microtubule distances ranging from 14 to 40 nm. Single microfilaments were often observed between parallel microtubules. During cell elongation, microtubule frequency (No./micro m) was maintained, thus indicating that microtubules must be formed continuously. The parallel orientation of wall microfibrils is disrupted as they deviate around plasmodesmata and pit-fields; however the cortical microtubules, thought to be influencing microfibril orientation, exhibit no consistent deviation around pit-fields.

0045 SHAH, C.K. 1983. Morphohistochemical studies on the embryos of some monocotyledons [including sorghum]. Phytomorphology 33(1-4): 62-73. 34 ref.

0046 YAMAZAKI, K., and NAKAMOTO, T. 1983. Primary root formation in the growing shoots of several cereal crops [sorghum]. (Ja). Japanese Journal of Crop Science 52(3): 342-348. (Summary:En).

All species showed a similar developmental pattern. Although root emergence kept pace with leaf emergence, the pace varied between species. Among species there was variation in stem diameters, the number and diameters of the primary roots, and the frequency of the secondary roots along the primary root axes. The basal diameter of the primary roots was closely correlated with the diameter of the stem on which they

appeared.

TAXONOMY AND GEOGRAPHIC DISTRIBUTION

0047 ARNOLD, T.H. 1983. Comments on primitive South African crop sorghums and the evolution of sorghum races in Africa. Bothalia 14(3-4): 587-594.

0048 IVANYUKOVICH, L.I. 1983. A review of the species of the series nervosa of the genus Sorghum Poaceae. (Ru). Botanicheskii Zhurnal 68(8): 1086-1089.

0049 IVANYUKOVICH, L.K. 1983. Survey of the varieties of Sorghum nigricans (Ruiz et Pavon) Snowd. and S. dulcicaule Snowd. (Ser. Caffra), rarely cultivated in the USSR. II. (Ru). Biulleten, Vsesoiuznyi Institut Rastenievodstva 131: 39-42. (Summary:En).

The paper deals with intraspecies classification of two sorghum species of the series Caffra based on the study of the living and herbarium VIR collection, using the types of the majority of varieties received from the Botanical garden in Kew (England) and taking into account the systems suggested previously. The key for their definition, synonymy, description, distribution are given. The species S. dulcicaule Snowd. has been divided into varieties. The paper quotes Latin and Russian diagnoses of the singled out varieties, the type of which is given to the Herbarium and systematics division of the VIR.

0050 MAINRA, A.K., and NAINAWATEE, H.S. 1983. Electrophoretic analysis and phylogenetic affinity of some sorghum species. Tropical Plant Science Research 1(1): 35-38. 14 ref.

Polyacrylamide gel electrophoresis of soluble proteins, alcohol dehydrogenase (ADH) and malate dehydrogenase (MDH) of seeds of 6 cultivated species of Sorghum, viz. S. bicolor, S. caffrorum, S. roxburghii, S. caudatum, S. durra and S. nervosum and two un-cultivated species, viz., S. sudanense and S. halepense was performed. Variability was observed in the electrophoretic patterns of proteins and enzymes of different species. Based on the similarities, 6 cultivated species were found to be closely related not only to each other but also to non-rhizomatous weed, S. sudanense. Rhizomatous weed, S. halepense, appeared to be unrelated to the cultivated species and non-rhizomatous weed, S. sudanense.

0051 TARUMOTO, I. 1983. Classification by principal component analysis and a hypothesis of evolution in the genus Sorghum. (Ja). Bulletin of the National Grassland Research Institute 24: 14-30. (Summary:En).

Seventy-six lines of 14 sorghum species were evaluated for 46 characters related to growth, morphology, disease and pest resistance. The lines were classed into 6 groups, using 21 of the characters.

PHYSIOLOGY AND BIOCHEMISTRY

0052 AISIEN, A.O., and PALMER, G.H. 1983. The sorghum embryo in relation to the hydrolysis of the endosperm during germination and seedling growth. Journal of the Science of Food and Agriculture 34(2): 113-121. 30 ref.

Light microscope analysis of structural changes showed that scutellar epithelial cell elongation was associated with endosperm reserve mobilization. Electron microscope studies verified preliminary histochemical and light microscope findings and showed that extensive metabolism of subcellular storage materials occurred during early germination and seedling growth. Physiological evidence indicated that both sorghum embryo and endosperm were insensitive to GA3. Other hormones also failed to induce alpha-amylase production. The whole body of the scutellum was capable of producing alpha-amylase.

0053 AISIEN, A.O., PALMER, G.H., and STARK, J.R. 1983. The development of enzymes during germination and seedling growth in Nigerian sorghum. Starch/Staerke 35(9): 316-320. 30 ref. (Summary:De).

Sorghum beta-glucanase was shown to be inactive towards barley beta-glucan. Gibberellic acid did not control the levels of aplha-amylase. The synthesis of this enzyme occured in the embryo but it subsequently acted on the starch granules in the endosperm. Limit dextrinase, was present in the endosperm as a zymogen. Proteases were also examined during germination and seedling growth. Amino acid-releasing enzymes developed in the embryo and were absent from the endosperm, whereas endoproteases could be detected in the embryo and to a greater extent in the endosperm. Amylolytic attack on endosperm starch in sorghum was very extensive during the early stages of grain growth. The significance of these results to the malting properties of sorghum is discussed.

0054 ALAGARSWAMY, G., and SEETHARAMA, N. 1983. Biomass and harvest index as indicators of nitrogen uptake and translocation to the grain in sorghum genotypes. Pages 423-427 In Genetic aspects of plant nutrition (Saric, M.R., and Loughman, B.C., eds.). The Hague, Netherlands: Martinus Nijhoff. 7 ref.

This paper deals with (i) the extent of variation in sorghum for the above characters, (ii) correlations of these traits with agronomic traits such as days to flower, biomass and grain yield and, (iii) the implications of (i) and (ii) in breeding and crop management.

0055 AMBLER, J.R., MORGAN, P.W., and JORDAN, W.R. 1983. Cytokinin concentrations in xylem sap of senescent and nonsenescent sorghums. Plant Physiology 72(1, suppl.): 168. (Abstract).

High-performance liquid chromatographic analysis showed that cytokinin concentrations of the nonsenescent variety 77CS2 were about three times those of the senescent RTx7000 both in mature field and vegetative growth chamber plants.

0056 AMTHOR, J.S. 1983. Sorghum seedling growth as a function of sodium chloride salinity and seed size. Annals of Botany 52(6): 915-917.

Sodium chloride salinity in the range 0-90 mM inhibited growth of sorghum seedlings. Seedlings derived from small seeds were most sensitive to salinity.

0057 ARAKCHEEV, V.I. 1983. Heat effect on quality of sorghum seed. (Ru). Kukuruza 3: 28-29.

Effects of heating seeds with 14-34% m.c. at 40-65 deg C for 30-150 min on germination and plant

growth of sorghum and sorghum x sudangrass hybrid are described.

0058 ARKIN, G.F., and JACKSON, B. 1983. User's guide to SORG-AP, a grain sorghum growth simulation model for an apple computer. Miscellaneous Publication, Texas Agricultural Experiment Station no. 1541. 54 pp.

0059 ARKIN, G.F., ROSENTHAL, W.D., and JORDAN, W.R. 1983. A sorghum leaf area model. Paper, American Society of Agricultural Engineers no. 83-2098.

0060 BACSA, P. 1983. Climatic and ecological characteristics and demands of broomcorn varieties. Sorghum Newsletter 26: 126-127.

Results of the study are presented: (1) If the average of weekly growth shows the smallest value, the length of panicles is the highest.(2) Intensity of heading varies with varieties and temperature. (3) Developing first class panicles requires higher temperature than higher yields do. (4) There is no connection between rate of scarto panicles and temperature. (5) There is, however, a close negative correlation between rate of first class panicles and that of scarto panicles. (6) Value of correlation coefficient is -0.74.

0061 BARAKHTENOVA, L.A., and NIKOLAEVSKII, V.S. 1983. The effect of sulfur dioxide on the photochemical activity and photophosphorylation of C3 and C4 plants. Biology Bulletin of the Academy of Sciences of the USSR 10(1): 65-73. 25 ref. [Also published in Izvestiya Akademii Nauk, SSSR, Biologicheskaya 1: 90-99. 1983].

The initial effect of SO2 was to activate the Hill reaction, which coincided with the phase in which photosynthesis is activated, and then it inhibited the photochemical activity, photophosphorylation and caused a deep, stable suppression of photosynthesis. SO2 inhibited photosynthesis by upsetting the activity of photosystem II and by inhibiting the photochemical activity and noncyclic photophosphorylation. This decreased the chloroplast contents of ATP and NADPH. The dark-synthesis of ATP in the chloroplasts of leaves from C4- and CAM-plants was observed.

0062 BERENJI, J. 1983. Analysis of the correlation between leaf parameters of a grain sorghum hybrid. Sorghum Newsletter 26: 140-141.

As part of a study on assimilatory surface area of sorghum, 56 plants of commercial sorghum hybrid Remenj were analyzed in Yugoslavia. The analysis revealed that the fourth leaf counted from the flag leaf was the biggest one, representing almost 20% of the total leaf area. The width of leaves was in higher correlation with the leaf area than the length, except the flag leaf. There was an inter-relation between the total leaf area, the area of the fifth leaf and the width of the same leaf. Total leaf area of the hybrid could be measured with only the maximum width of the fifth leaf.

0063 BERENJI, J. 1983. Seed set of sorghum panicles under various pollinator bags. Sorghum Newsletter 26: 47-48.

The highest no. of seeds was formed under the bags made of unglazed kraft paper and wax paper, often even more than on unbagged control heads. Cellophane bags are also suitable but in comparison with combined bags occasionally it reduces the seed set. Plastic

freezing bags and "rusting" plastic bags are extremely unsuitable for selfing sorghum panicles. Due to their non-permeability to air and to high humidity and temperature inside them the seed set was highly reduced specially in the case of broomcorn.

0064 BHASKARAN, S., SMITH, R.H., and SCHERTZ, K. 1983. Regeneration of plants from sodium chloride tolerant sorghum callus. Plant Physiology 72(1,suppl.): 142. (Abstract).

After ten months of culture on stress medium containing NaCl, surviving calluses showed better growth when transferred to media with or without NaCl than a control that had not been exposed to NaCl. Plantlets were regenerated from calluses grown on NaCl for up to 8 months, by transfer to hormone-free medium.

0065 BHASKARAN, S., SMITH, R.H., and SCHERTZ, K. 1983. Sodium chloride tolerant callus of Sorghum bicolor (L.) Moench. Zeitschrift fuer Pflanzenphysiologie 112(5): 459-463. 14 ref.

Callus cultures of sorghum obtained by prolonged culture on NaCl-containing medium were able to grow better on NaCl-containing medium than the parent cells. After every passage on the stress selection medium, part of the cultures were transferred to hormone-free medium for plant regeneration. Plants were regenerated from calli grown on NaCl-containing media for up to five passages. Some of these plants were albinos. A few green plants have been grown to maturity in the greenhouse. There was very low seed set in these plants.

0066 BOISEN, S. 1983. Protease inhibitors in cereals: occurrence, properties, physiological role, and nutritional influence. Acta Agriculturae Scandinavica 33(4): 369-381. 113 ref.

The occurrence of protease inhibitors in barley, rye, wheat, triticale, maize, rice, sorghum, oats, millet and buckwheat, their properties, physiological role in the plant and nutritional influence are reviewed.

0067 BORIKAR, S.T., SINGH, A.R., KATKADE, J.L., and CHOUDHARI, S.D. 1983. Manipulation of source in relation to seed quality and yield in sorghum. Sorghum Newsletter 26: 22-23.

Three parental lines were used to study the effect of defoliation on translocation, seed development, recovery and germination. The study revealed a decrease in stem dry weight with a decrease in source, indicating the increase in translocation from stem due to defoliation. The ear weight and seed yield were significantly reduced due to all defoliation treatments.

0068 BROWNE, C.L., and FANG, S.C. 1983. Differential uptake of mercury vapor by gramineous C3 and C4 plants. Plant Physiology 72(4): 1040-1042. 9 ref.

The uptake of mercury vapour by 6 gramineous plant species was compared under uniform conditions using a whole-plant chamber and 203Hg-labeled mercury at a low atmospheric concentration. Mean Hg uptake by leaves of the C3 species oats, barley, and wheat was 5 times greater than that by leaves of the C4 species corn, sorghum, and crabgrass. Although there was a difference in resistances associated with vapour entry into the leaves, as shown by estimates of gas exchange, the differential uptake by C3 and C4 species was

largely attributable to internal resistance to Hg vapour binding. The nature of the internal resistances and the site or sites of Hg vapour binding remain unspecified.

0069 BUTLER, L.G., RIEDL, D.J., and LEBRYK, D.G. 1983. Interaction of proteins with sorghum tannins: mechanism, specificity and significance. Journal of the American Oil Chemists' Society 60(4): 730.

The biological effects of tannin are a result of its propensity for binding proteins. In the digestive tract, sorghum tannins can bind dietary proteins and reduce their digestibility. Certain sorghum proteins associate strongly with tannin and are found combined with tannin in the indigestible residue after in vitro digestion with pepsin. When rats are put on high tannin sorghum diets, they produce a group of salivary proteins with extremely high affinity for tannin. These proteins contain over 40% proline and are devoid of sulfur-containing and aromatic amino acids.

0070 CHANDRA, R., and SIROHI, G.S. 1983. Carbondioxide compensation concentration in pea and sorghum as influenced by growth stage, nitrogen and moisture stress. Indian Journal of Plant Physiology 26(4): 331-336. 15 ref.

Carbondioxide compensation concentation (CO2CC) is influenced to a greater extent by growth stage in pea and sorghum. Moisture stress and nitrogen fertilization increased CO2CC. Sorghum, which is a C4 plant, showed CO2CC in the same range as that of a C3 plant towards maturity and also when there was moisture stress.

0071 CHANDRA, R., SIROHI, G.S., and RAGHUVEER, P. 1983. Effect of moisture stress on nitrate reductase activity (NRA) in pea (Pisum sativum L.) [C3] and sorghum (Sorghum vulgare Pers.) [C4] plants. Journal of Plant Nutrition 6(7): 629-640. 20 ref.

Nitrate reductase activity (NRA) was studied in pea and sorghum at various stages of growth. In sorghum, there was gradual increase in NRA upto grain formation followed by fall in activity at maturity. Nitrogen treatment as nitrate and ammonia significantly increased nitrate reductase activity over control in both pea and sorghum. Treatment with potassium nitrate was found to stimulate more NRA in pea than with ammonium sulphate. In sorghum, both forms of nitrogen did not differ much in their influence on NRA. Influence of moisture stress in reducing NRA was more clear in sorghum, than in pea. Control plants recorded low NRA in both the crops when compared to nitrogen treated plants.

0072 CHOPRA, R.K. 1983. Effects of temperature on the in vivo assay of nitrate reductase in some C3 and C4 species. Annals of Botany 51(5): 617-620. 10 ref.

Nitrate reductase (NR) activity was measured in vivo in different crop species at 25-60 deg C. Highest NR activity was observed at 40 deg C in pigeon pea, cowpea, sunflower, sesame and sorghum, 45 deg C in maize and 50 deg C in pearl millet. At higher incubation temperatures NR activity declined in all species. The results indicate that 30 deg C is not the optimum incubation temperature for all crop species.

0073 CHOUDHARI, S.D., and BHALE, N.L. 1983. Effect of photosynthetic area on germination of sorghum. Seed Research 11(1): 106-108. 4 ref.

Differences in germination percentage due to different leaf area treatments were significant. The germination percentage increased with increase in leaf area. Interaction between cultivars and leaf area treatment was significant. Increase in leaf area reduced the hard seed percentage and increased test weight.

0074 CHOUDHARI, S.D., and BHALE, N.L. 1983. Sorghum seed viability after pollination. Seed Research 11(2): 225-227. 5 ref.

An experiment was conducted at Sorghum Research Station, Parbhani, India to find out the viability of developing grain sorghum after pollination in kharif, 1977-78. Results indicated that the sorghum seed could germinate 20 days after pollination. Range of germination was from 17 to 62 per cent. Germination improved with increase in time after pollination. There were varietal differences in germination percentage and time after pollination. Application of higher level of nitrogen slightly increased germination percentage.

0075 CLINE, G.R., REID, C.P.P., POWELL, P.E., and SZANISZLO, P.J. 1983. Effects of a hydroxamate siderophore on plant iron absorption. Plant Physiology 72(1, suppl.): 139. (Abstract).

The ability of desferrioxamine B (DFOB), a microbially-produced Fe chelating agent of the hydroxamate siderophore class, to affect Fe absorption by sunflower and sorghum from buffered nutrient solution (pH7) was investigated. The presence of DFOB enhanced Fe absorption in both species when the molarity of Fe exceeded that of DFOB. When Fe was supplied equimolar with DFOB or at a level less than that of DFOB, DFOB induced similar benefits in sunflower but was detrimental to the growth of sorghum. It was concluded that sorghum absorbed nonchelated Fe, but could utilize DFOB as a shuttle agent to increase diffusion of nonchelated Fe.

0076 CONN, E.E. 1983. Cyanogenic glycosides: a possible model for the biosynthesis of natural products. Pages 11-22 In The new frontiers in plant biochemistry (Akazawa, T., Asahi, T., and Imaseki, H., eds.). Tokyo, Japan: Japan Scientific Societies Press. 55 ref.

Cyanogenic glycosides and the mechanism of cyanogenesis with reference to sorghum and Meliolotus alba are reviewed.

0077 CONNELLY, J.A., and CONN, E.E. 1983. Chorismate mutase from etiolated seedlings of Sorghum bicolor. Plant Physiology 72(1, suppl.): 128. (Abstract).

Chorismate mutase(CM) levels of 0.6 Unit per gram fresh weight were observed in 3 day etiolated sorghum seedlings. DEAE cellulose chromatography separated CM into 2 molecular forms CM2 and CM1 which differed in all characteristics measured. CM-1 was activated by tryptophan and inhibited by phenylalanine and tyrosine while CM-2 was unaffected. The inhibition was significant only at levels of tryptophan giving incomplete activation and was reversed at higher tryptophan levels. Dhurrin had no effect on either form of the enzyme.

0078 CRETIN, C., PERROT-RECHENMANN, C., VIDAL, J., GADAL, P., LOUBINOUX, B., and TABACHE, S. 1983. Study on plant phosphoenolpyruvate cartoxylases: sensitivity to herbicides and immunochemical reactivity. Physiologie Vegetale 21(5):

927-933. 12 ref. (Summary:Fr).

0079 CRETIN, C., VIDAL, J., GADAL, P., TABACHE, S., and LOUBINOUX, B. 1983. Differential inhibition of phosphoenol-pyruvate carboxylases by 2,4-dichlorophenoxyacetic acid and two newly synthesized herbicides. Phytochemistry 22(12): 2661-2664. 15 ref.

The effect of the herbicide, 2,4-D and two new phenoxy compounds on the in vitro activity of plant leaf phosphoenol-pyruvate carboxylases has been examined. The C4 leaf enzymes were completely inhibited by these chemicals. The activity of the sorghum leaf enzyme was partially recovered when either the effector glucose-6-phosphate or the substrate phosphoenol-pyruvate was added to the medium after the reaction had been started in the presence of the inhibitors. Glycine, another enzyme activator, did not reactivate the inhibited enzyme. An intermediary inhibition was shown to occur in etiolated sorghum leaves. Other enzyme activities of carbon and nitrogen metabolism were unaffected. The results allow discrimination between the metabolic type in plants. In this respect, the best response was obtained with the newly synthesized monochlorinated derivative.

0080 DICZBALIS, Y.A., and WILSON, G.L. 1983. The effect of temperature on the duration of growth stage one and consequences for grain yield. Sorghum Newsletter 26: 125-126.

Lower yields and seed number were obtained for the 20/15 deg C treatment inspite of the high leaf number obtained. Poor performance is attributed to leaf tip necrosis of emerging leaves after plants were transferred to the uncontrolled temperature glasshouse where the daily temperatures were in the mid 30 deg C. Leaf recovery during mid to late G.S.2 resulted in an increase in seed size. Plants grown at the highest population density under the 2 extreme temperatures during G.S.1 reached sizes and had leaf displays which were inappropriate to the density. Lowest density improved light interception.

0081 DU, S.H., and FANG, S.C. 1983. Catalase activity of C3 and C4 species and its relationship to mercury vapor uptake. Environmental and Experimental Botany 23(4): 347-354. 12 ref.

Significant differences of catalase activity were observed between C3 and C4 species: the average activity of C3 plants was greater than that of C4 plants. Positive correlations were observed between the catalase activity and in vivo uptake of mercury by leaves or in vitro uptake by leaf homogenates. Sodium aizde and sodium cyanide inhibited in vitro mercury uptake by the leaf homogenates. Treatment of intact plants with various amounts of ATA caused various degrees of inhibition in both mercury vapor uptake and catalase activity. For comparable amount of ATA, a greater inhibition of mercury uptake was observed in C3 plants than in C4 plants. However, there were no differences in inhibition of catalase activity between the C3 and C4 species. Observations from the results of experiment suggest that catalase plays a key role in mercury vapor uptake by C3 species and a lesser role in C4 species, particularly sorghum.

0082 DURLEY, R.C., KANNANGARA, T., SEETHARAMA, N., and SIMPSON, G.M. 1983. Drought resistance of Sorghum bicolor. 5. Genotypic differences in the

concentrations of free and conjugated abscisic, phaseic and indole-3-acetic acids in leaves of field-grown drought-stressed plants. Canadian Journal of Plant Science 63(1): 131-145. 32 ref. (Summary:Fr).

Concentrations of free and conjugated abscisic acid (AbA), phaseic acid (PA) and indole-3-acetic acid (IAA) were measured in leaves of sorghum genotypes. Hormone levels were compared and related to grain yield stability under drought, expressed as the percentage reduction in grain yield (percent RGY) of drought-stressed compared to irrigated plants. There was genotypic variation in free and conjugated IAA concentration in leaves of stressed plants, but these concentrations were not directly related to percent RGY. High levels of free and conjugated IAA were found at some periods in leaves of drought-susceptible genotypes. The positive relationship between free AbA concentration and percent RGY was confirmed in a 9 genotype comparison. Mean leaf AbA concentrations during flowering and early grain filling in drought-stressed plants significantly correlated with percent RGY. It is possible to evaluate genotype drought resistance to a given stress treatment in sorghum by examination of AbA, PA and IAA concentrations in leaves.

0083 EASTIN, J.D. 1983. Sorghum. Pages 181-204 In Potential productivity of field crops under different environments (Smith, W.H., and Banta, S.J., eds.). Los Banos, Laguna, Phillippines: IRRI. 52 ref.

The morphology, ecology, and physiology of sorghum are described. The influence of water supply and temperature on growth and yield is discussed.

0084 EASTIN, J.D., DICKINSON, T.E., KRIEG, D.R., and MAUNDER, A.B. 1983. Crop physiology in dryland agriculture. Pages 332-364 In Dryland agriculture (Dregne, H.E., and Willis, W.O., eds.). Madison, Wisconsin, USA: American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America. 136 ref.

Yield and water use efficiency, yield components, crop development, physiological processes, water consumption and future research prospects of sorghum, soybean, wheat, cowpea, pearl millet, and cotton are reviewed.

0085 FOMINA, I.R., BIL', K.YA, LADYGIN, V.G., MOSKALENKO, A.A., and MAGOMEDOV, I.M. 1983. Chlorophyll-protein complexes of green algae and higher plants. Heterogeneity of chloroplast complexes from dimorphic tissues of leaves of C4 plants. Biochemistry 48:(10, pt.1): 1379-1385. 29 ref.

It was found that the reduction of the activity of photosystem II in agranal chloroplasts of the bundle sheath cells of sorghum, maize and millets was due to the disappearance of the chlorophyll-protein complex of this photosystem. This was accompanied by an increase in the relative content of the chlorophyll-protein complex of photosystem I and by the partial loss of the light-harvesting pigment-protein complex, which explains the high activity of photosystem I and the low content of chlorophyll b in the given plastids. It is concluded that there is a close correlation between the "granality" of the membrane system of the chloroplasts and the presence of the chlorophyll-protein complex of

photosystem II.

0086 GADAL, P., VIDAL, J., JACQUOT, J.P., HIRD, B., PERROT-RECHENMANN, C., SUZUKI, A., and CRETIN, C. 1983 Light regulation of carbon and nitrogen metabolism enzymes: PEP carboxylase, NADP malate dehydrogenase, glutamine synthetase and glutamate synthase. Pages 249-254 In Photosynthesis and plant productivity: Joint Meeting of the O.E.C.D. and Studiezentrum Weikersheim, 11-14 October 1981, Ettlingen Castle, Federal Republic of Germany (Metzner, H., ed.). Stuttgart, Federal Republic of Germany: Wissenschaftliche Verlagsgesellschaft mbH.

Studies on enzymic acitivity in greening leaves of sorghum, maize and rice are described.

0087 HARDEN, M.L., and KRIEG, D.R. 1983. Contribution of preanthesis assimilate to grain fill in sorghum. Cereal Foods World 28(9): 562-563. (Abstract).

The relative contribution of both carbon and nitrogen assimilated prior to anthesis to the grain filling process under water stress was determined. Sorghum genotypes which differed in the degree of leaf senescence during grain filling and in seed protein concentration were selected for study. The nonstressed senescent hybrid produced larger panicles with more seed per panicle and more seed per unit leaf area than the nonsenescent hybrid and the lines. The senescent hybrid produced more leaf area but translocated more organic material from the bottom leaves; however, seed size was sensitive to drought. Plants with more total dry matter had more total nitrogen per plant. The seed nitrogen concentration at final harvest was slightly higher for lines and for plants grown under water stress.

0088 HASKINS, F.A., and GORZ, H.J. 1983. Influence of glyphosate on growth and hydrocyanic acid potential of sorghum seedlings. Sorghum Newsletter 26: 102. 3 ref.

Seeds of Redlan B sorghum were germinated for 4 days in water-saturated vermiculite in the dark to investigate the inhibition of dhurrin biosynthesis by glyphosate. Increased levels of glyphosate resulted in decreased weight of seedling tissue. Even at the highest glyphosate levels, quantities of HCN were about 4 times as great as the maximum which might have arisen from the tyrosine initially present in the seed.

0089 HASKINS, F.A., and GORZ, H.J. 1983. Is p-hydroxybenzaldehyde a major constituent of epicuticular wax from Sorghum bicolor seedlings? Phytochemistry 22(2): 611-612. 8 ref.

Free p-hydroxybenzaldehyde was not present in appreciable quantity on the surface or in the interior of week-old sorghum shoots that had been heated to inactivate hydrolytic enzymes, nor was p-hydroxybenzaldehyde detected in epicuticular wax of greenhouse-grown sorghum ca 4.5 months old.

0090 HERMUS, R.C., FUKAI, S., and WILSON, G.L. 1983. Development of sorgnum panicles under different environmental conditions. Sorghum Newsletter 26: 126.

Two experiments were conducted to study the effect of water deficits and temperature at defined stages of inflorescence growth on subsequent inflorescence

development and on spikelet number. The slowing or halting of development during the development periods did not impede the subsequent differentiation of the panicle, and in some cases enhanced development, even though the plants were exposed to decreasing available water. The subsequent development was not affected and final spikelet number was lower in the temperature treatments. Lower temperature had greater effect on development, which was too low for dry matter production.

0091 JAGTAP, B.K., SHINGTE, A.K., and PHARANDE, K.S. 1983. Studies on leaf area of sorghum at various stages under different nitrogen levels. Sorghum Newsletter 26: 132. 3 ref.

The studies revealed that, the leaf area increased with increase in the N levels, maximum being with 125 kg N/ha. The leaf area increased with age of the plant and after 75 days it decreased.

0092 JORDAN, D.B., and OGREN, W.L. 1983. Species variation in kinetic properties of ribulose 1, 5 bisphoshate carboxylase oxygenase. Archives of Biochemistry and Biophysics 227(2): 425-433.

0093 KANNANGARA, T., SEETHARAMA, N., DURLEY, R.C., and SIMPSON, G.M. 1983. Drought resistance of Sorghum bicolor. 6. Changes in endogenous growth regulators of plants grown across an irrigation gradient. Canadian Journal of Plant Science 63(1): 147-155. 15 ref. (Summary:Fr).

A gradient of water stress was created among sorghum plants with a line-source sprinkler irrigation system. Abscisic acid (AbA) levels were increased and phaseic acid (PA) levels were reduced under stress. IAA levels could not be related to stress. Leaf water potential, leaf solute potential, and leaf conductance were reduced and leaf temperature was increased by water stress. Leaf area development was more sensitive to stress than stem elongation. Linear correlations between irrigation, AbA, leaf water potential, leaf solute potential, and plant height were high. The correlation between AbA and grain yield was similar to that between irrigation and grain yield, but opposite in sign. Leaf AbA content measured during early growth could thus be used to predict grain yield under a given irrigation regime.

0094 KARAJEH, P.P.R. 1983. Evapotranspiration, yield and growth of sorghum under different water levels and irrigation cutbacks. M.Sc. thesis, Jordan University, Amman, Jordan. 82 pp. 51 ref. (Summary:Ar).

0095 KATASE, M., USHIJIMA, T., and TAZAKI, T. 1983. The relationship between absorption of sulfurdioxide (SO2) and inhibition of photosynthesis in several plants. Botanical Magazine 96(1041): 1-13. 44 ref.

Photosynthetic rate, transpiration rate and SO2 absorption rate were simultaneously measured under exposure to SO2 for 5 or 8 h in sorghum and other plants. Distinct interspecific differences were found as to the extent of inhibition of photosynthetic rate. The absorption of SO2 was dependent upon the gas exchange capacity of leaf blade. The rate of SO2 absorption, calculated from transpiration rate was compared with the inhibition of photosynthesis increased linearly with the amount of SO2 absorbed during a 5-hour period.

0096 KATKADE, J.L., SINGH,

A.R., and BORIKAR, S.T. 1983. Seed germination as influenced by chemical and chilling treatments in sorghum. Sorghum Newsletter 26: 133.

Five parental lines were subjected to 17 treatments. The treatments included KNO2, Thiourea, ascorbic acid, GA3, prechilling and control. The differences due to genotypes, treatments and genotype x treatment interaction were significant. The seed germination due to 500 ppm GA3 was highest.

0097 KAWASAKI, T., AKIBA, T., and MORITSUGU, M. 1983. Effects of high concentrations of sodium chloride and polyethylene glycol on the growth and ion absorption in plants. 1. Water culture experiments in a greenhouse. Plant and Soil 75(1): 75-85. 23 ref.

To provide a better understanding of plant responses to salt and water stresses, the effects of high concentrations of sodium chloride (NaCl) and polyethylene glycol (PEG) on the growth and ion absorption in sorghum, beans, and maize were examined at similar osmotic potential conditions, using the water culture method. The inhibitory effect on plant growth appeared to be only slightly larger in PEG treatment than in NaCl treatment. However, the depressive effects on K, Ca and Mg contents of plants were more severe with NaCl treatment than with PEG treatment. No depressive effects of NaCl or PEG were observed for P content. From the short term absorption experiment using a tracer technique, it was also evident that the inhibition of K absorption was more drastic in NaCl treatment than in PEG treatment. On the other hand, the inhibitory effects of high concentrations of NaCl and PEG were very small on P absorption.

0098 KHAN, R.U., MISHRA, R.C., and DABHOLKAR, A.R. 1983. Effect of removal of primary branches on grain yield. Sorghum Newsletter 26: 132-133.

An experiment was conducted on 6 cultivars at Indore, India. Branches were removed as soon as earheads emerged from boot leaf. All the cultivars flowered at the same time. Highly significant differences were observed among the cultivar and the treatments. Yields from no removal of primary branch, removal of 10, and 15 primary branches were at par.

0099 KRESS, L.W., and MILLER, J.E. 1983. Impact of ozone on grain yield of winter wheat and sorghum. Phytopathology 73(5): 820. (Abstract).

The hybrid sorghum (DeKalb A28+) was exposed between 16 July and 8 October to four O3 concentrations above an ambient of 0.040 ppm. Yield reductions were slight even at the two highest O3 treatments.

0100 KRIEG, D.R. 1983. Photosynthetic activity during stress. Agricultural Water Management 7(1-3): 249-263. 33 ref.

Developmental and physiological effect of water stress on photosynthetic activity, growth and yield of sorghum and cotton were studied. Leaf area development, photosynthetic rate, and source-sink ratio responses were studied as photosynthetic parameters. Genetic variation was found in every parameter examined.

0101 KRIEG, D.R. 1983. Sorghum. Pages 351-388 In Crop-water relations (Teare, I.D., and Peet, M.M., eds.). New York, USA: John Wiley. 194 ref.

Growth and development, soil-plant water relations, metabolic responses to water

deficits, and applied aspects of water management of sorghum are covered in this literature review.

0102 KULKARNI, L.P., CHOUDHARI, S.D., TIKBOTKAR, A.B., and KALYANKAR, S.P. 1983. Relationship of physiological parameters with grain yield in sorghum under rabi season. Sorghum Newsletter 26: 134.

An experiment was conducted using 8 genotypes under rabi season in Parbhani, India to determine the relationship of physiological parameters with grain yield. It was concluded that the genotypes which had high DMA at maturity, early flowering, early maturing, higher number of primaries, secondaries and grains per cob were higher yielding.

0103 LERNER, H.R., BALLARIN DENTI, A., and PRADET, A. 1983. Induced pore formation in membranes of cortex cells in excised sorghum roots: its effect on membrane potential and nucleotide leakage. Physiologia Plantarum 57(1): 90-94. 19 ref.

Measurements of membrane potentials were used for screening various molecules capable of inducing pore formation in cellular membranes for their ability to penetrate into excised roots of sorghum. Poly-L lysine (30,000 MW) and amphotericin B did not affect cortical cells even though they affected epidermal cells; the lysine polymer and the amphotericin B micelle were apparently too large to diffuse into the roots. Polymyxins and filipin depolarized the epidermal cells as well as the cells of the cortex. Depolarization of cortical cells by filipin was slower than that by polymyxins. Leakage of adenylate nucleotides was measured to obtain information concerning the size of pores induced by polymyxins. Incubation with 200 micro g/ml polymyxin B caused leakage of ATP from root segments. Leaked nucleotides were found in the medium; however, with time they were dephosphorylated, by cell wall phosphatases. In situ ATP formation was observed when root segments were incubated with polymyxin, ADP, Pi, succinate and glucose, confirming that the induced pores were larger than the size of a nucleotide.

0104 MA, H.T., and LIANG, G.H. 1983. In vitro culture of immature sorghum embryos. Sorghum Newsletter 26: 138.

Among 221 regenerated plants (Ro) studied, morphological variations and fertility alterations were observed. Calli placed on dedifferentiation medium for 15-85 days before transferring to redifferentiation medium produced Ro plants with shorter height, delayed flowering date, and lighter kernel weight than those placed on medium for 45 days. When calli were transferred to the buffering medium containing 1 mg 2,4-D/1 then transferred to 0mg 2,4-D/1, regeneration increased 10%.

0105 MA, H.T., RODGER, D.M., and LIANG, G.H. 1983. Immature embryo culture of Sorghum bicolor L. Moench. Agronomy Abstracts. p. 71.

Embryo formed calluses on KS5 medium and regenerated into plantlets without 2,4-D. Genotypic variation was noticed in their responses. Regenerated plants tended to be earlier flowering and shorter with lighter grains and had varying degrees of sterility.

0106 MAHALAKSHMI, V., and SEETHARAMA, N. 1983. System approach to crop improvement [sorghum] for water limited environments. Presented at the National Symposium on Advancing

Frontiers of Plant Sciences, 26-30 November 1983, University of Jodhpur, Jodhpur, India. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0107 MAITI, R.K. 1983. Evaluation of sorghum for multiple stress resistance in the semi-arid tropics of North West Mexico. (Es). Marin, Nuevo Leon, Mexico: Universidad Autonoma de Nuevo Leon, Facultad de Agronomia. 28 pp. (Folleto de Divulgacion no. 1).

0108 MAITI, R.K. 1983. Evaluation of sorghum for multiple stress resistance: an approach towards sorghum improvement in Semi-arid tropics. Presented at the Silver Jubilee Celebration, Indian Society for Plant Physiology, 20-22 January 1983, Indian Agricultural Research Institute, New Delhi, India. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0109 MAITI, R.K., RAJU, P.S., and BIDINGER, F.R. 1983. Evaluation of visual scoring for seedling vigour in sorghum. (Es). Marin, Nuevo Leon, Mexico: Universidad Autonoma de Nuevo Leon, Facultad de Agronomia. 15 pp.

0110 MAJOR, D.J., and WILSON, D.B. 1983. Sorghum potential in Alberta. Pages 59-62 In Research highlights 1982, Research Station, Lethbridge, Alberta. Lethbridge, Alberta, Canada: Research Station.

The potential of sorghum as dryland crop in southern Alberta was studied at Lethbridge, Canada. Germination tests revealed that for every decrease of 1 deg C below 20 deg, germination was delayed by 0.42 days. In rotation trials, sorghum produced similar yields and had similar drought resistance to those of barley and wheat.

0111 MANN, J.A. 1983. The relationship of germination parameters to field adaptation and heat stress tolerance in Sorghum bicolor (L.) Moench. Ph.D. thesis, Texas A & M University, College Station, Texas, USA. 167 pp.

Four experiments were conducted to determine the base germination temperature and its relationship to adaptation. The genotypes with high base germination temperatures were earlier to mature, taller and higher yielding than the ones with low base germination. The heat stress tolerance (HST) index was negatively correlated to yield at the hottest locations. Divergent selection was possible only for HST. Seed produced under higher temperatures and longer daylengths during seed maturation had higher base germination values.

0112 MANN, J.A., and MILLER, F.R. 1983. Germination temperature relationship to adaptation in Sorghum bicolor (L.) Moench. Sorghum Newsletter 26: 138.

The study reports that the ability to germinate under heat stress is negatively related to base germination temperature.

0113 MANN, J.A., MILLER, F.R., and MCFARLAND, M.J. 1983. Relationship of base temperature and heat stress tolerance at germination to field adaptation in Sorghum bicolor (L.) Moench. Agronomy Abstracts. p. 72.

Yield and other data were compared with germination characteristics of 80 F4 lines. Preliminary results showed a relationship between germination parameters at low temperatures and field performance over a range of environments.

0114 MARACCHI, G., PAMPALONI, P., LOSAVIO, N., and

RASCHI, A. 1983. Energy and transpiration in a sorghum (Sorghum vulgare L.) yield model. Rivista di Agronomia 17(1, suppl.): 144-148. 10 ref. (Summary:En).

The relationships between the production factors, radiation, stomatal resistance at several values of water potential variables are determined. Structure of the model is outlined for dry matter production equation. The conformity of growth analysis values and simulation results confirms the usefulness of the model.

0115 MARTIN, F., WINSPEAR, M.J., MACFARLANE, J.D., and OAKS, A. 1983. Effect of methionine sulfoximine on the accumulation of ammonia in C3 and C4 leaves. Plant Physiology 71(1): 177-181. 22 ref.

Additions of methionine sulfoximine (MSX), an inhibitor of glutamine synthetase (GS), result in an increase in NH3 in seedling leaves of C3 and C4 (corn and sorghum) plants. NH3 accumulation is higher in C3 than in C4 leaves. Under ideal conditions, when photosynthesis is not yet inhibited by the accumulation of NH3, the rate of NH3 accumulation is about 16% of the apparent rate of photosynthesis. A maximum accumulation of NH3 was elicited by 2.5 millimolar MSX and was essentially independent of the addition of NO3- during either the growth or experimental period. When O2 levels in the air were reduced to 2%< MISX resulted in some accumulation of NH3. At these levels of NH3, there was no significant inhibition of rates of CO2 fixation. There was also a minor, but significant, accumulation of NH3 in corn roots treated with MSX. Inhibitors of photorespiration or transaminase reactions inhibited the accumulation of NH3 in both C3 and C4 leaves.

0116 MCCREE, K.J. 1983. Carbon balance as a function of plant size in sorghum plants. Crop Science 23(6): 1173-1177. 17 ref.

The photosynthetic input, conversion efficiency and maintenance requirement of sorghum were determined as a function of plant size in plants growing under constant conditions. Although the sorghum plants grew much faster than field-grown plants of the same cultivar, the morphology and growth characteristics were shown to be very similar when compared at the same size of plant. The maintenance requirement per unit biomass decreased with increasing plant size, for plants with a biomass of 19 gC. The protein content decreased in about the same proportion. The average maintenance requirement per gram of protein was 39 mgC g/protein/day, which is considerably less than that of white clover growing under the same conditions. A smaller fraction of the protein is degradable in sorghum than in clover.

0117 MCCREE, K.J. 1983. Daily carbon balance of sorghum plants. Plant Physiology 72(1, suppl.): 185. (Abstract).

Photosynthetic input and maintenance requirement per plant increased with increasing plant size. While conversion efficiency remained constant at 67%. Maintenance requirement was proportional to protein content and reached 30% of photosynthetic input in large plants.

0118 MOHR, H., and DRUMM-HERREL, H. 1983. Coaction between phytochrome and blue/UV light in anthocyanin synthesis in seedlings. Physiologia Plantarum

58(3): 408-414. 26 ref.

The four species investigated with regard to light-mediated synthesis of anthocyanin in seedlings (mustard, sorghum, tomato, wheat), differed greatly with regard to their photoperception. Phytochrome was involved in the photoresponse in all cases. It is concluded that the Pfr- mediated differential gene activation leading to anthocyanin synthesis is the core of the response. However, the different species differ greatly with regard to the red, blue and UV light dependent processes they perform in order to establish sensitivity towards phytochrome (Pfr), or to amplify sensitivity towards Pfr.

0119 MOURSI, M.A., ABD-EL-GAWAD, A.A., EL-TABBAKH, A.A., ASHOUB, M.A., and ABD-EL-HALIM, A.Z.M. 1983. Influence of sorghum and cowpea seed-root exudates on their germination and seedling development. Pages 199-210 In Proceedings of the First Conference of Agronomy, 10-12 September 1983, Cairo, Egypt. v. 2. Cairo, Egypt: Egyptian Society of Crop Science.

0120 NELSON, J.E., MEGGITT, W.F., PENNER, D., and LADLIE, J.S. 1983. The influence of environmental factors on oryzalin activity. Weed Science 31(5): 752-758. 7 ref.

Effects of temperature, sunlight, soil incorporation and surface irrigation on the phytotoxicity of oryzalin (3,5-dinitro-N4, N4 - dipropylsulfanilamide) on sorghum root growth was studied. Growth chamber studies demonstrated that oryzalin phytotoxicity to grain sorghum was greater at 20 and 25 C than at 30 C. Injury to sorghum increased as the thoroughness of mechanical incorporation of oryzalin into soil increased. The phytotoxicity of surface-applied oryzalin increased with increasing amounts of irrigation water until it equalled the level of a preplant-incorporated treatment.

0121 NES, W.D., and HEUPEL, R.C. 1983. Evidence for differences in sterol turnover in sorghum. Federation Proceedings 42(7): 1838.

The 24-desalkyl and 24-alkyl sterol mixture present in the leaves of flowering sorghum plants was identified by a combination of GLC HPLC, MS and NMR. The results imply that cholesterol synthesis is highly regulated and has a different function than the three 24-alkyl sterols. Since the 24a-ethylcholesta-5, 22-dienol has a significantly lower specific activity than cholesterol but high mass, this sterol may have been synthesized early in the plant's development and of the sterols present may play the dominant nonmetabolic architectural role in the lipid leaflet.

0122 NEWTON, R.J., and BALACHANDRA, S. 1983. Osmotic adjustment in sorghum. Plant Physiology 72(1, suppl.): 12. (Abstract).

Growth, water status, and solutes of sorghum seedlings, growing in the dark were characterized while subjected to moderate water stress. Growth reduction occurred in the mesocotyl. Stressed shoot tips increased in dry weight and total soluble carbohydrates. Shoot tip turgor was maintained as shoot tip water potential decreased to -8 bars. Soluble carbohydrates accounted for 5 to 11% of the change in osmotic potential.

0123 NEWTON, R.J., MECKENSTOCK, D.H., and MILLER, F.R. 1983. Soluble carbohydrates in developing sorghum caryopses. Crop Science 23(1): 80-82. 22 ref.

Plants taken from anthesis to 45 days post-anthesis were assayed with gas-liquid chromatography and correlated with caryopsis fresh weight, dry weight, and maturity. Three major time intervals are described by the data in the development and metabolism of the caryopsis: I, 8 to 18 days; II, 21 to 30 days; and III, 33 to 45 days. Rate of fill, water content, and sugar concentrations reached a maximum during Interval 1. The rapid decrease of sucrose with the subsequent attainment of constant levels, the attainment of maximum caryopsis fresh weight and the beginning of black layer formation were observed during Interval II. Maximum dry weight, minimum rate of water loss and increased molar concentrations of sucrose were observed during Interval III. Day 33 was determined as the precise time of physiological maturity. Total sugars comprised about 5% of the caryopsis dry weight at day 15 and 0.8% on day 42.

0124 NIKOLAU, B.J., WURTELE, E.S., and STUMPF, P.K. 1983. Leaf tissue distribution of acetyl-CoA carboxylase (ACCbx). Plant Physiology 72(1, suppl.): 20. (Abstract).

The distribution of ACCbx activity in epidermal protoplasts, mesophyll protoplasts and bundle sheath strands of sorghum and maize was studied. ACCbx activity was found in all tissues examined. In the bundle sheath strand ACCbx activity was about 70% of that found in the mesophyll tissues.

0125 NIKOLAU, B.J., WURTELE, E.S., and STUMPF, P.K. 1983. Leaf tissue distribution of acetyl-CoA carboxylase (ACCbx). Plant Physiology 72(1, suppl.): 20. (Abstract).

The distribution of ACCbx activity in epidermal protoplasts, mesophyll protoplasts and bundle sheath strands of sorghum and maize was studied. ACCbx activity was found in all tissues examined. In the bundle sheath strand ACCbx activity was about 70% of that found in the mesophyll tissues.

0126 NOJIMA, H., OIZUMI, H., TAKASAKI, Y., and NAKAZAWA, M. 1983. Effect of cytokinin on lateral buds development in excised stem of Sorghum bicolor M. (Ja). Technical Bulletin of Faculty of Horticulture, Chiba University 32: 93-98. 23 ref. (Summary:En).

0127 OCHANDA, N.W., MILLER, F.R., and ROSENOW, D.T. 1983. The relationship of dry matter production of unconverted photoperiod sensitive sorghum cultivars to grain yield of their converted counterparts. Sorghum Newsletter 26: 139-140.

A close relationship was found between dry matter production and leaf area among the exotic sorghum cultivars tested at Lubbock, Texas, USA. No significant relationships were established between dry matter production among the exotic sorghum cultivars and grain yield of their converted counterparts. Grain yield among the converted sorghum cultivar was positively correlated with harvest index, number of days to anthesis, leaf area and total plant yield.

0128 OGATA, S., KUBO, T., FUJITA, K., and KOUNO, K. 1983. Studies on interaction between carbon and nitrogen metabolism in C3 and C4 plants. 1. Effects of nitrogen nutrition on photosynthetic rates, and ribulose-1, 5-bisphosphate carboxylase and phosphoenol-pyruvate carboxylase activities. Journal of Japanese Society of Grassland Science 29(1): 1-9. 25 ref. (Summary:Ja).

The effect of N nutrition on photosynthesis of sorghum and other plants were studied. Total N content was highly correlated with photosynthetic rate. Higher proportions of soluble protein fractions in the N compounds and increased enzymic activity due to increasing leaf N content increased photosynthesis.

0129 OGUNLELA, V.B., and OLOGUNDE, O.O. 1983. Response of sorghum yield and yield components to partial defoliation. Sorghum Newsletter 26: 127-128. 7 ref.

The study revealed that leaf removal at advanced vegetative stage is more detrimental to sorghum yield than at grain filling. Leaves in the top third portion of sorghum canopy are more important determinants of yield than leaves in the middle or bottom third portion.

0130 OHNISHI, J.I., and KANAI, R. 1983. Differentiation of photorespiratory activity between mesophyll and bundle sheath cells of C4 plants. I. Glycine oxidation by mitochondria. Plant and Cell Physiology 24(8): 1411-1420. 32 ref.

Photorespiratory glycine oxidation and related enzyme activities of mesophyll and bundle sheath mitochondria of sorghum and other C4 plants were compared. Mesophyll mitochondria showed good P/O ratios with malate and succinate as substrate but lacked the ability to oxidize glycine. The two enzymes involved in glycine metabolism in mitochondria, serine hydroxymethyltransferase and glycine decarboxylase, were also assayed in the mitochondria of the two cell types. The activities of the two enzymes in bundle sheath mitochondria were in the range found in C3 mitochondria. The results indicate the deficiency of a complete glycine oxidation system in mesophyll mitochondria and also a differentiation between mesophyll and bundle sheath cells with respect to the photorespiratory activities of the mitochondria.

0131 ORTIZ CERECERES, J., VALDIVIA BERNAL, R., SANCHEZ DE JIMENEZ, E., and ORTEGA DELGADO, M.L. 1983. Some biochemical and physiological aspects of the germination of the grain of sorghum (Sorghum bicolor (L.) Moench) in the ear. (Es). Agrociencia 54: 125-141. 26 ref. (Summary:En).

Germination, enzymic activity and the % proteins and polyphenols were dependent on the genotype and stage of maturity. Use of biochemical criteria in selecting for resistance to sprouting in ear showed promise.

0132 OTTO, V., MOSINGER, E., SAUTER, M., and SCHAFER, E. 1983 Phytochrome control of its own synthesis in Sorghum vulgare and Avena sativa. Photochemistry and Photobiology 38(6): 693-700. 26 ref.

The accumulation of phytochrome in the dark was measured for Avena sativa seedlings after a white light pretreatment and for sorghum seedlings after continuous red or far-red light treatments, using the herbicide Norflurazon to prevent greening under continuous irradiation. The accumulation of phytochrome depended on the state of the phytochrome at the light-dark transition: high Pfr levels led to a slower rate of phytochrome accumulation than lower Pfr levels. Poly-(A-)-RNA was isolated from A. sativa seedlings grown for 48 h in darkness + 24 h wave length + light pulse (5 min) + 19 h darkness. The poly-(A-)-RNA was translated in a rabbit reticulocyte lysate system and the

translation products were immuno precipitated by specific anti-phytochrome antibodies. It was demonstrated that the activity of mRNA coding for phytochrome was under phytochrome control.

0133 PANDUSASTRY, K., and KRISHNAMURTHY, K. 1983. Panicle development in sorghum as influenced by changes in sowing date. Indian Journal of Agricultural Sciences 53(12): 1015-1021.

Panicle and spikelet differentiations were enhanced with the advancement in sowings from January to September. The branch-initiation phase was more in the crops sown in January to April and September to December. The period between panicle initiation and stigma initiation in spikelets was more in the crops sown in January to March and October to December than the one sown in June to August. There was a significant negative relationship between minimum temperature and the total period of panicle development and a significant positive relationship between bright sunshine hours per day and total period of panicle development.

0134 PAO, C.J., and MORGAN, P.W. 1983. Peroxidases in sorghum maturity genotypes during floral initiation. Plant Physiology 72(1, suppl.): 8. (Abstract).

The activity of the peroxidases was more in the soluble fraction in leaves than in the culm. Polyacrylamide gel electrophoresis revealed an increase in the number of cationic isozymes of both soluble and covalently bound peroxidases at the time of floral initiation.

0135 PARTRIDGE, J.E., WOZNIAK, C.A., and SCHROETER, S. 1983. Regeneration of sorghum plants from nodal plate derived callus. Phytopatholoy 73(5): 830. (Abstract).

Several growth regulators were evaluated for their effects on induction, maintenance and differentiation of callus tissue. Transfer to Murashige-Skoog medium containing 3-6 mM IAA initiated organogenesis which led to whole plant regeneration.

0136 PATIL, T.M., MIRAJKAR, P.B., HEGDE, B.A., and JOSHI, G.V. 1983. Influence of soil salinity on morphology, rate of carbon assimilation, photosynthetic products and enzyme activities in a sorghum hybrid CSH-5. Indian Journal of Plant Physiology 26(2): 155-162. 10 ref.

Soil salinity adversely affected photosynthetic area as well as rate of carbon assimilation. The lowered photosynthetic ability under salt stress conditions was due to stomatal closure inhibition of chlorophyll synthesis and the decreased activity of PEP and RuBP carboxylases. Excessive accumulation of malate during steady state photosynthesis could be correlated with the possible inhibition of malic enzyme. The reduction in yield was attributed to the low rate of photosynthesis and reduced synthesis of sugars. It is concluded that sorghum hybrid CSH-5 is salt sensitive and records negligible yield beyond soil salinity of 1.6 EC.

0137 RADIN, J.W. 1983. Control of plant growth by nitrogen: differences between cereals and broadleaf species. Plant, Cell and Environment 6(1): 65-68. 22 ref.

In 4 dicotyledonous species low levels of N strongly inhibited leaf expansion during the day but had little or no effect at night. In

contrast, daytime and night-time expansion were equally affected in 4 cereal species including sorghum. The results confirm that in dicotyledons, N controls leaf expansion through its effects on hydraulic conductivity. In such N-limited plants, water deficits generated by transpiration may inhibit daytime cell expansion. In cereals, cell expansion and transpiration occur in separate zones of the leaf and are apparently unrelated. Growth analysis showed that low levels of N inhibited leaf area growth more strongly in dicotyledons than in cereals, but had similar effects on net assimilation rates of plants in the two groups. As a result, dry matter production was more efficient in cereals than in dicotyledons when N was limiting.

0138 RAJAGOPAL, C.K. 1983. Dimethyl sulphoxide as an agent for better translocation of nutrient ions within plants. Madras Agricultural Journal 70(9): 626-628. 4 ref.

The effect of organic manures and DMSO on translocation of nutrients within the plant and yield of sorghum Co-24 is reported.

0139 RAJASEKHAR, V.K., GUHA-MUKHERJEE, S., and SOPORY, S.K. 1983. The effects of delta-aminolevulinic acid and inhibitors of RNA and protein synthesis on phytochrome mediated chlorophyll accumulation in Sorghum bicolor. Journal of Experimental Botany 34(148): 1444-1454. 46 ref.

In 5-day-old etiolated seedlings of sorghum, 12 h of darkness after 5 min in red light eliminated a lag before the accumulation of chlorophylls in subsequent continuous white light. Increasing the dark period to 24 h and 36 h, increased rate of chlorophyll accumulation in the later stages of greening. Exogenous delta-aminolevulinic acid neither completely removed the lag, nor increased the rate of chlorophyll accumulation. Cycloheximide and 6-methyl purine, given continuously or only until the 12 h dark period following the red light irradiation, restored the lag and decreased the rate of chlorophyll accumulation. D-threo-chloramphenicol also decreased the rate of chlorophyll accumulation but did not restore the lag. Addition of these inhibitors even 12 h after red light irradiation decreased the rate of chlorophyll accumulation. Rifampicin did not have such effects.

0140 RAJASEKHAR, V.K., GUHA-MUKHERJEE, S., and SOPORY, S.K. 1983. Time dependence of phytochrome-mediated carotenoid and chlorophyll synthesis in Sorghum bicolor L. Annals of Botany 52(2): 159-163. 16 ref.

In 5-day-old etiolated sorghum seedlings, red light irradiation for 1 s enhanced carotenoid and chlorophyll accumulation, and 5 min of red light treatment saturated the photoresponse. The degree of red/far-red photoreversibility of carotenoid accumulation was dependent on the age of the plant. No significant escape from far-red reversibility was observed up to 30 min after the onset of a saturating red light pulse in 5-day-old etiolated seedlings. Thereafter, the escape was relatively fast and completed within 180 min.

0141 REDDY, V.C., RAGHAVENDRA, A.S., and DAS, V.S.R. 1983. Photosynthetic units and carbon assimilation in leaves of grain sorghum under different light intensities. Plant and Cell Physiology 24(8): 1395-1400. 23 ref.

The cytochrome f (Cyt f) and P700 contents in leaves of 3 sorghum varieties were measured, in relation to their carbon assimilation, under different light intensities during growth. At the maximum irradiation used the ratio of P700 to Cyt f was close to unity, whereas under low irradiation the ratio of P700 to Cyt f ranged from 2 to 3. A significant positive correlation existed between the P700 contents of the leaves and their rates of carbon dioxide fixation, dry matter production and Cyt contents, when the plants were grown under high light intensities. The P700 content of the leaves in plants grown under low irradition was unrelated to the contents of Cyt f. Thus, at a high light intensity there is a close relationship between the Cyt f and P700 levels, but at low intensities the amounts of electron carriers and the reaction centre are independent.

0142 REGER,B.J., and SPRAGUE, J.J. 1983. Pearl millet and sorghum pollen tube growth in pearl millet gynoecia of different ages. Crop Science 23(5): 931-934. 9 ref.

Pearl millet pollen tubes grew normally in gynoecia having stigmas emerged for less than 4 days (younger gynoecia) at pollination, and fertilization occurred. Pollination of stigmas emerged for more than 4 days (older gynoecia) resulted in inhibition of pollen tube growth within the gynoecium. In contrast, sorghum pollen tube growth increased significantly in older vs. younger gynoecia. Sorghum pollen tubes in the ovary increased from 4% in younger to 22% in older gynoecia. Apparently the internal environment of pearl millet gynoecia changed with age. These changes appear to alter the pollen tube transmitting tract in the gynoecium making it inhibitory to pearl millet pollen tubes and less inhibitory to sorghum pollen tubes.

0143 SALVUCCI, M.E., and BOWES, G. 1983. Ethoxyzolamide repression of the low photorespiration state in two submersed angiosperms. Planta 158(1): 27-34. 36 ref.

The net photosynthesis of plants in the high-photorespiration plants was found to be slightly inhibited by ethoxyzolamide and the inhibition independent of the CO2 level. Ethoxyzolamide increased O2 inhibition of net photosynthesis and the low CO2 compensation points of low-photorespiration plants bud did not change the values for high photorespiration plants. In comparison, the CO2 compensation points of sorghum was unaltered by ethoxyzolamide treatment.

0144 SAMPATH, P., and KULANDAIVELU, G. 1983. Photochemical activities and organization of photosynthetic apparatus of 3 carbon pathway plants [sorghum] grown under different light intensities. Photosynthesis Research 4(4): 351-360.

Progressive decrease in the growth light intensity accelerated the O-P fluorescence induction in whole leaves. Such acceleration of the fluorescence kinetics was found to be not due to enhanced photosystem II activity but possibly a result of reduced rate of electron flow between the two photosystems. The P700/cytochrome f ratio, however, increased from the usual 1-1.5 to 3-4 in plants grown under 9% sunlight. Increase in the P700/cytochrome f ratio was found to be due to a decrease in the cytochrome f/chlorophyll ratio, and this was due to a simultaneous increase in chlorophyll and

decrease in cytochrome content.

0145 SCHAFER, E., and HAUPT, W. 1983. Blue light effects in phytochrome-mediated responses. Pages 723-744 In Encyclopedia of plant physiology, New Series. v. 16B. Photomorphogenesis (Shropshire, W. Jr., and Mohr, H., eds.). Berlin, Federal Republic of Germany: Springer-Verlag. 72 ref.

In this review, the interactions of phytochrome and cryptochrome are analyzed to study the photomorphogenic effects in sorghum and other plants.

0146 SEETHARAMA, N., SIVAKUMAR, M.V.K., BIDINGER, F.R., SINGH, S., MAITI, R.K., REDDY, B.V.S., PEACOCK, J.M., REDDY, S.J., MAHALAKSHMI, V., SACHAN, R.C., RAJ, A.S., MURTY, S.R.K., NARAYANAN, A., KANNANGARA, T., DURLEY, R.C., and SIMPSON, G.M. 1983. Physiological basis for increasing and stabilising yield under drought in sorghum. Proceedings of the Indian National Science Academy, Part B 49(5): 498-523. 110 ref.

Major reasons for slow progress in increasing yield under water-limited environment are listed and the relationships between crop productivity and drought resistance are examined. Phenological, morphological, physiological and biochemical adaptations to drought in sorghum are discussed. Results of interdisciplinary research in understanding drought resistance are discussed with respect to available screening methods, genetic variability and breeding methods. Breeding and management strategies aimed at increasing transpirational water use throughout the season and decreasing injury caused by drought is recommended.

0147 SHARPE, P.J.H. 1983. Responses of photosynthesis and dark respiration to temperature. Annals of Botany 52(3): 325-343. 91 ref.

This analysis suggests that a model of the temperature dependence of carbon exchange by a plant can be developed based upon absolute reaction rate theory. Component temperature-dependent physiological processes necessary to describe net photosynthesis over the biological temperature range include the light reaction, dark reaction (carboxylase CO2 uptake, oxygenase photorespiration) and mitochondrial dark respiration. An essential assumption of the model is the reversibility of thermal inhibition. Supporting evidence for this assumption is provided within the biological range. Thermodynamic constants were found to be strongly correlated with the thermal environment to which they were adapted. There was little difference in non-photorespiration thermodynamic constants between C3 and C4 species within thermal habitat types. The model shows the observed shift in temperature optima with light intensity as a natural consequence of enzyme kinetics and absolute reaction rate theory. Data on the response of photosynthesis to temperature are discussed for sorghum and other plants.

0148 SHCHERBAK, E.I. 1983. The use of photosynthetically active radiation by sorghum sowing. (Ru). Problemy Osvoeniya Puskyn' 3: 64-68. 8 ref. (Summary:En). [Also published in Problems of Desert Development 3: 75-80. 1983].

The values of mid-suspended coefficients of integral radiation transmission and photosynthetically active radiation on periods of sorghum growth are defined and it is determined that the transmission coefficients are decreased under

increase of vegetative mass reaching 0,15-0,18 values - for integral radiation and 0,03-for PAR while in initial periods of plants they are 0,65-0,70 and 0,54. The absorption coefficient of PAR is increased with photosynthetic surface growth of the plants and it reaches 0,80-0,85 under optimal development of the leaf surface area of 40-50 thousands sq m2/ha, i.e., sorghum plants use more than 3/4 of energy of the photosynthetically active radiation.

0149 SHI, J.N., WU, M.X., ZHA, J.J., TANG, X.Y., and YE, Z.Y. 1983. Studies on plant phosphoenolpyruvate carboxylase. IX. Reversible acid dissociation and deactivation of PEP-carboxylase from sorghum leaves. (Ch). Acta Phytophysiologia Sinica 9(1): 31-39. 22 ref. (Summary:En).

0150 SINGH, A.R., BORIKAR, S.T., KATKADE, J.L., and PAWAR, K.R. 1983. Seed quality in relation to rain damage in sorghum. Sorghum Newsletter 26: 134-135.

Results revealed that rain damages seed quality and this damage can be avoided by harvesting before rain damage and/or by thiram sprays.

0151 SINGHVI, N.R., and SHARMA, K.D. 1983. Effect of salt solutions of different osmotica on germination and seedling growth of Sorghum vulgare Pers. Science and Culture 49(11): 364-366. 4 ref.

It was observed that with increasing osmotic potential and pH values of different chemicals there was suppression of percent seed germination and seedling growth, but were affected differently with respect to osmotica. The germination and seedling growth retarded due to increase in salinity and ion toxicity.

0152 SMITH, R.H., BHASKARAN, S., and SCHERTZ, K. 1983. In vitro selection for aluminum tolerant sorghum plants. Plant Physiology 72(1, suppl.): 142. (Abstract).

Calluses initiated from germinated seeds were cultured on media containing 0, 100, 200, and 400 micro M Al. Subcultures of tolerant lines on media with and without Al grew better in the presence of Al. Plantlets were regenerated from 0, 100, and 200 micro M Al treatments by transfer to hormone-free medium.

0153 SMITH, R.H., BHASKARAN, S., and SCHERTZ, K. 1983. Sorghum plant regeneration from aluminum selection media. Plant Cell Reports 2(3): 129-132. 15 ref.

Callus cultures of 4 sorghum cultivars were initiated from germinated seed. Prior to culture on media containing 0, 100, 200, and 400 micro M Al, the callus had been subcultured for 3-12 months. There were differences amongst the cultivars in response to Al tested. Subculture of callus from Al selection medium on both Al containing and Al free media indicated that Al selected callus grew better in the presence of Al. Plants were regenerated from only one cultivar after several passages on Al supplemented media. Regeneration capacity was however inhibited at 400 micro M Al.

0154 SONI, H.S., BORIKAR, S.T., and SINGH, A.R. 1983. Effect of gamma irradiation on seed germination and seedling vigor in sorghum. Sorghum Newsletter 26: 133.

The results revealed linear reduction in the germination with increase in the dose of gamma rays. Both seedling height and vigour index revealed decreasing trend with increase in the dose of mutagen in all the varieties

tested.

0155 SRIRAM, N., and RAO, J.S. 1983. Physiological parameters influencing sorghum yield. Indian Journal of Agricultural Sciences 53(8): 641-649. 12 ref.

Of the 9 genotypes studied the low yielders showed specific source limitation to grain yield by having fewer leaves, lower leaf area (LA) and leaf-area ratio (LAR) and shorter leaf-area duration (LAD) at flowering and initial grain-filling stages, besides poor partitioning of the assimilates to the grain and predominant sink limitation, as evident from the panicle and grain characters. Of the various growth parameters studied, the number of leaves, LA, LAR, LAD and shoot height showed strong association with yield, especially at the flowering stage. Among the yield components, the HI, dry weight of panicle and grains/panicle showed maximum correlation with yield and had maximum direct effects on yield. These growth and yield components may be considered as important selection parameters.

0156 SULLIVAN, C.Y. 1983. Genetic variability in physiological mechanisms of drought resistance. Iowa State Journal of Research 57(4): 423-439. 37 ref.

This report, using sorghum as a model examines some facets of drought resistance and suggests research methods. Plant response is divided into tolerance and avoidance mechanisms, among which no single one will account for field drought resistance. Hydroponic studies demonstrate that sorghum genotypes differ in rooting characters. That deep rooting is a major avoidance mechanism is demonstrated by the corelative relationship of deep rooting with drought resistance and yield in the field. The line source sprinkler and gradient irrigation systems were found useful for field testing and the subsequent selection of drought resistant genotypes. These field studies show a linear relationship between yield and evapotranspiration, but the regression slopes differ dependent on the period of water stress.

0157 TAKASAKI, Y., OIZUMI, H., and NOJIMA, H. 1983. Mortality of sorghum plants after cutting. Pages 445-447 In Proceedings of the Fourteenth International Grassland Congress, 15-24 June 1981, Lexington, Kentucky, USA (Smith, J.A., and Hays, V.W., eds.). Boulder, Colorado, USA: Westview Press. 3 ref.

Three field experiments were carried out to investigate the effect of sowing date, planting density, nitrogen (N) level, high temperature and cultivar on mortality rate after cutting. Mortality was found to increase when sorghum was cut at an early growth stage and to be higher as density and N level increased. Mortality among cultivars differed significantly. Regrowth was greater as temperature increased. Most dead plants belonged to the lower frequency distributions of plant length, plant yield, and Brix but were higher in N content. Positive correlations were found among plant length, plant yield, and Brix scale reading. N content was found to correlate negatively with these characters. Multiple regression, using yield of regrowth as the dependent variable and plant yield, Brix, and N content as the independent variables, accounted for 92% of the variation. Linear regression using only plant yield as the independent variable accounted for 90% of the variation and explained the relation as well as the multiple regression equation.

0158 TSAI, D.S., and

ARTECA, R.N. 1983. Effects of root applications of gibberellic acid on photosynthesis in 3 carbon pathway and 4 carbon pathway plants. Plant Physiology 72(1, suppl.): 151. (Abstract).

The photosynthetic rates of sorghum treated with GA3 were increased 32% above the control. Eight of the 12 species tested showed a stimulation in their photosynthetic rate following GA3 treatment. There was no correlation between C3 or C4 plants with respect to responsiveness to GA3 treatments.

0159 UPCHURCH, D.R., and RITCHIE, J.T. 1983. Root observations using a video recording system in mini-rhizotrons. Agronomy Journal 75(6): 1009-1015. 13 ref.

An equipment for observing root growth in the field is described. Its suitability was evaluated in field trials on grain sorghum.

0160 UWAIFO, A.O. 1983. Biological and biochemical changes in two Nigerian species of sorghum (SK. 5912 and HP3) following premalting-gamma-irradiation treatment. Journal of Agricultural and Food Chemistry 31: 1292-1295. 14 ref.

Two Nigerian species of sorghum - Sorghum caudatum (SK.5912) and Sorghum guineense (HP3) were gamma-irradiated prior to malting on a Cobalt irradiator. The species were exposed to the following doses-0.22, 0.44, 1.76, and 4.95 krd - in the assays for diastatic power, beta-amylase, and alpha-amylases, while in the assays for germinative energy and lengths of rootlets and acrospire they were exposed to a dose range of 0-5 krd. A dose of 1.76 krd raised the diastatic power, beta-amylase, alpha-amylase, germinative energy, and lengths of rootlets and acrospire maximally relative to those of unirradiated sorghum in the species studied. This effect of 1.76 krd was, however, higher in SK.5912 species than in HP3 species. This dose also raised DNA levels in the two species relative to that of unirradiated species but had the reverse effect on protein levels in the two species.

0161 VADIVELU, K.K., KRISHNASAMY, V., and RAMASWAMY, K.R. 1983. Further studies on the flowering behaviour of the parental lines of CSH-5 and Kovilpatti tall sorghum hybrids under Coimbatore conditions. Madras Agricultural Journal 70(9): 615-617. 4 ref.

Data on the days to panicle initiation and half bloom in all the 4 lines tested are compared. Correlation coefficients between days to panicle initiation and to half-bloom and the role of weather in the flowering of the lines are presented. Sowing of the parental lines of Kovilpatti hybrid simultaneously during the winter season resulted in efficient pollination and seed set.

0162 VALDIVIA BERNAL, R., SANCHEZ DE JIMENEZ, E., ORTIZ CERECERES, J., and ORTEGA DELGADO, M.L. 1983. Method of extraction and measurement of the catechol oxidase enzyme in sorghum grain. (Es). Agrociencia 53: 99-108. 16 ref. (Summary:En).

The proposed method of extraction and enzymatic analysis is a modification of procedures described for other species. The enzyme was solubilized with 1% Triton X-100 and analyzed in 0.1M phosphate-citrate buffer pH 7.3, using as substrate the diphenol catechol. Some properties of the catechol oxidase in the sorghum grain are discussed.

0163 VAN BERKUM, P., and SLOGER, C. 1983. Interaction of combined nitrogen with the expression of root-associated nitrogenase activity in grasses and with the development of N2 fixation in soybean (Glycine max L. Merr.). Plant Physiology 72(3): 741-745. 16 ref.

Soluble root N concentrations of corn, sorghum, pearl millet, rice, wild rice, and soybeans were determined and related to measurements of nitrogenase activity and changes in availability of combined N to plants. In corn, sorghum, and pearl millet, applications of fertilizer N increased soluble root N concentrations, but root-associated nitrogenase activity was negligible in control and treated plants.

0164 VERMA, P.K., WADE, L.J., PEACOCK, J.M., SEETHARAMA, N., PRASAD, J.S., and HUDA, A.K.S. 1983. Leaf area response to water and nitrogen stress in sorghum. Sorghum Newsletter 26: 130-132. 3 ref.

Leaf number was reduced only under nitrogen stress. Leaf sizes were reduced under both nitrogen and water stress. Water stress also delayed flowering.

0165 VIDAL J., and GADAL, P. 1983. Influence of light on phosphoenol pyruvate carboxylase in sorghum leaves. I. Identification and properties of two isoforms. Physiologia Plantarum 57(1): 119-123. 23 ref.

Chromatography on DEAE-cellulose of an extract from etiolated leaves of sorghum, a C4 plant, gave only one form of phosphoenol pyruvate carboxylase with functional and regulatory properties of a C3 type plant enzyme. Greening of the leaves resulted in a significant increase in activity. This increase was due to the appearance of a new form of the enzyme, which eluted at lower ionic strength and exhibited new properties. This form was glucose-6-P activated and showed a sigmoidal curve response to the concentration of the substrate phosphoenolpyruvate. These kinetic properties are typical of a C4 plant enzyme.

0166 VIDAL, J., CRETIN, C., and GADAL, P. 1983. The mechanism of photocontrol of phosphoenolpyruvate carboxylase in sorghum leaves. Physiologie Vegetale 21(5): 977-986. 19 ref. (Summary:Fr).

During the greening process of the leaves of sorghum, a C4 plant, the activity of phosphoenolpyruvate carboxylase increased ten to twentyfold. Diethylaminoethyl cellulose chromatography showed that this increase was due to the appearance of a new form (C4 form) of the enzyme. In the same time, the amount of the isoform initially present (C3 form) in etiolated leaves remained almost constant. Both oligomeric isoforms and the corresponding monomers displayed different, physicochemical and immunochemical properties. The molecular mechanism of the photoregulation process was studied. By using, radiochemical labelling and immunochemical techniques it was established that illumination triggers the de novo synthesis of the C4 form in the specialized mesophyll cells.

0167 VIDAL, J., GODBILLON, G., and GADAL, P. 1983. Influence of light on phosphoenol pyruvate carboxylase in sorghum leaves. II. Immunochemical study. Physiologia Plantarum 57(1): 124-128. 14 ref.

Greening of the leaves in the presence of D20 did not lead to a

significant increase in the buoyant density of the enzyme. On the other hand, cycloheximide was a powerful inhibitor of the rise in PEP carboxylase activity. In order to clarify these conflicting data a procedure based on the immunoprecipitation of the enzyme and its quantification by gel electrophoresis was developed in order to estimate the amount of enzyme in leaf tissue. The results clearly demonstrate that light triggers an increased synthesis of the enzyme protein during greening of sorghum leaves.

0168 VOIGT, R.L., BORQUE, P., and DOBRENZ, A.K. 1983. Photosynthetic stability of sorghum germplasm selected with an irrigation gradient system. Sorghum Newsletter 26: 135-137. 10 ref.

Data illustrate the variability in physiological stability when sorghum is grown under "optimum" and "stress conditions." Sorghum lines which can maintain higher rates of CO2 uptake under stress environments should be considered as valuable germplasm for breeding programs.

0169 WAGATSUMA, T. 1983. Characterization of absorption sites for aluminium in the roots. Soil Science and Plant Nutrition 29(4): 499-515. 24 ref.

Several experiments on the absorption sites for Al in the roots and the changes in the chemical forms of Al absorbed with time were carried out on plant spp. including sorghum x sudangrass. The Al content in the roots was positively correlated with the CEC of the dry root powder. Extraction of pectic substances, nucleic acids, cold 10% trichloroacetic acid soluble phosphates significantly decreased the subsequent absorption of Al. Al content of the dry root powder was considerably higher than that of the excised roots which were treated with Al. The time course of Al uptake by the dry root powder was different from that by the excised roots: after aproximately 1 h of Al treatment the Al uptake by the dry root powder increased remarkably and proportionally to the time of Al treatment, while that by the excised roots increased only slightly.

0170 WIEGAND, C.L., NIXON, P.R., and JACKSON, R.D. 1983. Drought detection and quantification by reflectance and thermal responses. Agricultural Water Management 7(1-3): 303-321. 40 ref.

Drought can be detected by its effect on plant canopy development as indicated by measurements of biomass production, leaf area index (LAI), and ground cover in the reflective wavelengths and by canopy minus air temperature in the thermal infrared wavelengths. Both measures are quantitative, but quantification in terms of drought's economic impact requires that relationships between canopy 'appearance' as revealed by the measurements and effect on salable plant parts be established. The measurements themselves are becoming routine and their quantification in terms of drought's economic impact on grain sorghum and wheat grain yields have been demonstrated, but are not yet routine. Seven considerations in a system for drought quantification are discussed, and results of semi-operational applications to drought assessment that incorporate most of the considerations are described.

0171 WONG, R., R., MUNOZ OROZCO, A., and MENDOZA ONOFRE, L.E. 1983. Effect of drought on vegetative, reproductive and efficiency characteristics of

sorghum varieties. Agrociencia 51: 101-114. 23 ref. (Summary:En).

Twenty-five B lines, 24 R lines and one sorghum hybrid were evaluated under an irrigation-drought scheme. The drought treatment was intended to cover the flowering period. Drought affected head dry weight more than the vegetative parts of the plant, since the water deficiency occurred after the vegetative stage. Most of the genotype showed a decreased dry matter production during the grain filling period and a later recovering. Yield decrease was 20% in relation with the irrigated treatment; this reduction was related to a low leaf area efficiency per day during the grain-filling period, mainly. In opposition to other species, in these genotypes anthesis was earlier under drought than under irrigation.

0172 WRIGHT, G.C., SMITH, R.C.G., and MORGAN, J.M. 1983. Differences between two grain sorghum genotypes in adaptation to drought stress. III. Physiological responses. Australian Journal of Agricultural Research 34(6): 637-651. 42 ref.

A sorghum hybrid (E-57) giving a higher yield under rain-fed systems of production was studied to examine the physiological basis of this effect. A comparison was made with another hybrid (TX-671) with similar maturity. E-57 was able to maintain stomatal opening to a lower leaf water potential than TX-671 because of its greater capacity to osmoregulate. In E-57 osmotic potential declined due to active solute accumulation, thus maintaining turgor as leaf water potential declined to -2.0 MPa. In contrast, TX-671 could only maintain this adjustment to -1.4 MPa. The differences in osmoregulation were associated with maintenance of leaf area, water extraction and possibly root growth by E-57. This indicated that osmoregulation enabled photosynthesis to continue and that a significant amount of the resultant assimilate may have been diverted to root growth.

0173 WRIGHT, S.A., JORDAN, W.R., MORGAN, P.W., and MILLER, F.R. 1983. Genetic and hormonal control of shoot and root growth of sorghum. Agronomy Journal 75(4): 682-686. 26 ref.

Tall and short lines of 'kafir' and 'milo' sorghum that were near-isogenic for height were examined to determine if genes which control height also exert a similar influence on root growth. Lines were compared both in hydroponics and in soil-filled root chambers in the field. Effects of exogenous GA3 applied to the shoot were also evaluated. In the field, differences in height of approximately 1 m developed between isolines of both kafir and milo, but the taller lines also developed 25 to 39% greater leaf areas. More roots were observed in the upper 60 cm of the soil profile in chambers containing the tall isolines, but when total root numbers were normalized with leaf area there were no differences between isolines. The GA3 application to tall and 3-dwarf milo plants in hydroponic culture stimulated internode length of both cultivars, but reduced leaf area, root length, and root volume. Shoot dry weights of the tall and short isolines were increased by 19.6 and 9.9%, respectively, by GA3 treatment, while corresponding root dry weights decreased by 20.7 and 20.4%.

0174 ZHA, J.J., WU, M.X., and SHI, J.N. 1983. Isolation and purification of phosphoenolpyruvate carboxylase from sorghum leaves.

(Ch). Acta Phytophysiologia Sinica 9(1): 23-30. 25 ref. (Summary:En).

PEP-carboxylase was purified approximately 74-fold from sorghum leaves by means of (NH4)2 SO4 fractionation, stepwise solubilization, heat treatment, and chromatography on DEAE cellulose, DEAE-sephadex and hydroxylapatite. The purified enzyme was shown to be homogenous by sodium dodecyl sulfate polyacrylamide gel electrophoresis and ultra-centrifugation. The results from immunodiffusion experiments also showed that the enzyme preparation was free from any RuBP-carboxylase contaminations. The enzyme has an approximate molecular weight of 380,000 daltons and consists of four identical subunits.

0175 ZUOCHANG, L., and HUIXIN, L. 1983. Studies on in vitro chloroplast protein synthesis in sorghum. (Ch). Acta Genetica Sinica 10(4): 268-273. 13 ref. (Summary:En).

The products of protein synthesis in isolated chloroplasts were analyzed by electrophoresis on sodium dodecyl sulphate polyacrylamide gels. The proteins of whole chloroplasts contained 13 zones of radioactivity, two major radioactive components having molecular weight of about 57000 and 37000 respectively. The membrane-bound proteins contained 11 labelled polypeptides. There were two zones of radioactivity in the gels of the soluble fraction. Patterns of the labelled polypeptides was simpler than electrophoretic patterns of stained polypeptides. It is suggested that only a few of the chloroplast proteins were coded by the chloroplast DNA, while most of the chloroplast proteins were controlled by the nuclear genome. Most of the zones with radioactivity in the gels were chloroplast membrane proteins.

GENETICS AND BREEDING

0176 AMBEKAR, S.S., and NANDANWANKAR, K.G. 1983. Screening of germplasm lines for bold grains. Sorghum Newsletter 26: 18.

Four hundred and ninety six cultures of 7 races were evaluated to select bold grain lines having better yielding ability. The grain yield, weight/1000 grains, plant height and grain yield of selected lines are presented.

0177 ANTOHE, I., COSMIN, O., and VOICU, E. 1983. High content of protein, lysine and tryptophane in a grain sorghum progeny from crossings with P-721. Sorghum Newsletter 26: 99.

A progeny with 16.5% protein, 0.572 lysine and 0143 tryptophane was selected from crossing between F 378c Romanian grain sorghum R line and P-721-hl-line. These C6 progeny possessed good agronomic traits and were 5 days earlier to the male parent P-721.

0178 AZZINI, A., SALGADO, A.L. DE B., and MENTEN, J.F.M. 1983. Cellulose yield, basic density and fiber dimensions in sorghum. (Pt). Bragantia 42(15): 172-178. 6 ref. (Summary:En).

A study was made with different genetic material of sorghum to determine cellulose yield; basic density and fiber dimension (length, width, lumen and cell wall thickness). The results showed that cellulose yield and basic density of the culms altered significantly among the material. The basic density was smaller after the sugar extraction with hot

water. The fiber length did not alter significantly among the material.

0179 BACHIREDDY, V.R., and YORK, J.O. 1983. Inheritance of pericarp and testa colors in certain of the caudatum sorghums. Proceedings of the Louisiana Academy of Sciences 46: 41-48. 20 ref.

Yellow pericarp colour resulted only when a dominant allele for the gene Y was present and the gene R was homozygous recessive. Red colour was expressed when dominant alleles of the genes R, Y, and I were present. When the intensifier gene I was homozygous recessive with R and Y being dominant, pink pericarp was found. White pericarp was produced only when Y, or both R and Y, were homozygous recessive. Brown colour in the kernels having red, pink, yellow, and white pericarps resulted when genes B1, B2 and S were represented by dominant alleles. It was confirmed that two complementary genes, B1, and B2, are responsible for the presence of a testa.

0180 BACON, R.K. 1983. Breeding sorghum for seedling cold survival and development. Ph.D. thesis, Purdue University, West Lafayette, Indiana, USA. 93 pp.

The agronomic characters were evaluated to determine the correlated responses in PP9CT following selection for seedling cold tolerance. Plant height showed a somewhat erratic response. Days to half bloom decreased by 0.55 days/cycle, seed colour increased by 0.13 colour units/cycle, and grain yield increased by 197.74 kg/ha/cycle. Sorghum introductions from China, kaoliangs, were evaluated as a possible source of cold tolerant genes. Some of these lines had very good potential as sources of sorghum cold tolerant genes.

0181 BAWAZIR, A.A.A. 1983. Studies on combining ability and the nature of gene action in F1 diallel crosses in grain sorghum, Sorghum bicolor (L.) Moench. Pages 658-666 In More food from better technology (Holmes, J.C., and Tahir, W.M., eds.). Rome, Italy: FAO. 15 ref.

The combining ability for yield components and insect pest resistance and correlation among these traits in a diallel cross was studied. Additive gene effects predominated for height and 100-grain weight and nonadditive for other traits.

0182 BENNETT, M.D., HESLOP-HARRISON, J.S., SMITH, J.B., and WARD, J.P. 1983. DNA density in mitotic and meiotic metaphase chromosomes of plants (sorghum) and animals. Journal of Cell Science 63: 173-180.

0183 BHALE, N.L., and BORIKAR, S.T. 1983. Combining ability for yield and yield components in rabi sorghum. Journal of Maharashtra Agricultural Universities 7(3): 247-249. 13 ref.

A line x tester analysis of combining ability for 10 characters in rabi sorghum revealed the importance of non-additive gene action for yield and yield contributing characters. The restorer 285 is desirable for earliness and bold grain size. 36A and 1202A among male-steriles and 168 and PD-3-1-11 among restorers are desirable combiners for yield and some yield contributing characters. The good combiners viz., 36A, 168, PD-3-1-11 and 285 are useful for improving rabi sorghums.

0184 BHARATHI, M., and MURTY, U.R. 1983. Estimation of

aposporous potential in sorghum. Page 520 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

The various embryological parameters were estimated in the apomictic line R 473 of sorghum along with a sexual line. The sum of the frequencies of ovules with multiple and unfertilized embryo sacs having intact synergids and restituted antipodals corresponded with the frequency of apomixis in R473.

0185 BIRADAR, S.G., and BORIKAR, S.T. 1983. Genetics of basal internodal length in sorghum. Sorghum Newsletter 26: 90-91. 1 ref.

The genetics of basal internodal length was studied in progeny from 3 crosses involving shoot fly resistant lines. Scaling tests viz., A, B and C were non-significant indicating the absence of non-allelic gene interactions in the inheritance of basal internodal length. Both additive and dominance components were significant in the cross 168 X 923. In SF 863 X 923 and SF 863 X 168 progeny only additive component was significant. Predominance of additive gene action indicated the possibility of fixing desired internodal length. The genotype with longer basal internode may show higher seedling vigor resulting in shoot-fly resistance.

0186 BIRADAR, S.G., and BORIKAR, S.T. 1983. Genetics of trichome density in sorghum. Page 720 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Gene effects for trichome density for adaxial and abaxial leaf surfaces were estimated by using 6 generations of 3 crosses involving shootfly resistant and susceptible parents. The additive components were significant for both leaf surfaces. However, dominance x dominance components were significant for adaxial and additive x dominance for abaxial leaf surfaces.

0187 CHANDAK, R.R., and NANDANWANKAR, K.G. 1983. Genetic architecture studies for panicle and grain characters in sorghum. Page 525 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Seven sorghum hybrids and their parents were studied for genetic architecture. Additive and dominance gene effects were observed for panicle length, weight and grain yield. Magnitude of dominant gene action was larger than additive for panicle characters. For grain size the magnitude of dominance was higher than additive gene effects.

0188 CHAUDHARY, H.R., ESQUIVEL, L.G., and MORAN, G. 1983. Study of combining ability and the nature of gene action in grain sorghum. Agronomy Abstracts. p. 59.

Analysis of data on several agronomic characters from sorghum F1 hybrids and their male-sterile and male-fertility restoring parent lines, indicated that general and specific combining ability effects and additive and nonadditive components of genetic variance were important for all characters. Results also suggested that environmental factors affected

estimated genetic parameters. Some lines appeared suitable for hybrid combinations, others for production of synthetic or composite populations.

0189 CHAUDHARY, H.R., VELAZQUEZ, J.E., ISLAS, E.S., and NAVARRO, E. 1983. Homeostatic response of selected genotypes from random mating populations of sorghum. Page 528 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

The homeostatic response of selected genotypes to varying agroclimatic conditions was studied. The analysis of variance revealed significant differences among the genotypes in most of the agronomic characters studied. The lower buffering capacity of some genotypes were attributed to the reduced level of genetic variability in the original populations which in turn was due to their poor maintenance.

0190 CISSE, A.H. 1983. Evaluation of the progress in improving sorghum populations: comparison of different generations. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 55 pp.

0191 CLEGG, M.D., EASTIN, J.D., and NELSON, L.A. 1983. Field evaluation for cool-tolerance in grain sorghum. Crop Science 23(1): 23-26. 15 ref.

The objectives of this research were to develop a procedure that quantitated the developmental rate of sorghum under cool nighttime temperatures and to determine if genetic variation existed for this trait. A developmental index (DI), based on relative heat units to 50% anthesis for each genotype grown in 2 environments, was used. Results showed that lines and hybrids from Canada or the northern USA generally had positive DI values. Lines selected in the environment with the high nighttime temperatures generally had negative DI values, whereas, lines selected in the environment with the low nighttime temperatures generally had positive DI values. Parent lines identified as cool-tolerant tended to pass the trait to their progeny. Maturity among these genotypes seemed to be independent of the DI value for that genotype. This DI appeared to quantitate the ability of a sorghum genotype to maintain a relative developmental rate under cooler nighttime temperatures and there seemed to be substantial genetic variation for the trait this index measures.

0192 COX, T.S., and FREY, K.J. 1983. Experimental introgression of wild germplasm into cultivated sorghum in India. Agronomy Abstracts. p. 60.

Populations derived from wild x cultivated sorghum crosses and backcrosses to the cultivated parent, evaluated in India, deviated significantly from the expected change in genetic variance with backcrossing. Genetic variance for grain yield reached a maximum in the BC1 or BC2, depending on the mating. Generation means also deviated from the expected linear increase. An epistatic model involving gene regulation is suggested as the cause.

0193 DABHOLKAR, A.R., and BAGHEL, S.S. 1983. Diallel analysis of grain mould resistance in sorghum. Genetica Agraria 37(3-4): 327-334. 9 ref.

Two varieties of sorghum highly susceptible to grain mold, two moderately resistant and three

less susceptible were crossed in a diallel fashion excluding reciprocals in Indore, India to understand the mode of inheritance of resistance to grain molds. Parental lines were genetically diverse for reaction to grain mold artificially developed by inoculating earheads with spore suspension of Curvularia lunata. Both additive and nonadditive genetic components of variance determined the expression of mold reaction. Genes for resistance were on the whole recessive to genes for mold susceptibility. SPV 29 and 2219 B appeared to possess dominant genes for resistance.

0194 DABHOLKAR, A.R., TIKKA, S.B.S., and DESAI, K.B. 1983. Factors contributing to diversity in sorghum crosses. Indian Journal of Agricultural Sciences 53(7): 498-503. 9 ref.

In the rainy seasons of 1977 and 1978, 21 F1s and 21 F2s of sorghum were grown with 7 parents. On the basis of D2 values, the 28 genotypes were grouped into 7 clusters in the F2 and 8 clusters in the F1. Days to 50% flowering, plant height, grain yield/plant, 1,000-grain weight and number of grains/panicle were studied. In the F1 analysis there was a tendency for the crosses to club with their parents. This was particularly so in the crosses involving '555' as a parent. In the F2, the populations spread into different clusters. Days to 50% flowering and plant height contributed maximum to the divergence.

0195 DADI, T., and ENGELS, J. 1983. Crop germplasm maintained at the Plant Genetic Resources Centre/Ethiopia. PGRC/E-ILCA Germplasm Newsletter 2: 2-6.

7095 accessions of sorghum species were held at the Plant Genetic Resources Centre, Ethiopia as on 31 December 1982.

0196 DAS, P.K. 1983. Inheritance study of total soluble solids in sorghum. Indian Agriculturist 27(4): 311-315. 6 ref.

The diallel cross technique was used to study the mode of inheritance of total soluble solids in seven inbred sorghum. The study indicated that total soluble solids were primarily controlled by both additive and dominant gene effects and dominant effects were more pronounced registering an overdominance for the character. The narrow sense heritability was low and the character was controlled by at least one effective factor.

0197 DE ARAUJO, M.R.A., LIRA, M. DE A., and MACIEL, G.G. 1983. Yield stability analysis in grain sorghum. Sorghum Newsletter 26: 2-3. 1 ref.

The adaptability and stability of 9 grain sorghum lines under the agroclimatic conditions of the semi-arid Pernambuco, Brazil were evaluated. Sorghum lines IPA 7300201, 7300007, 7300206, 7300984, and 73001154 appeared to have high grain yield potential and good stability.

0198 DEMBELE, F., and GALIBA, M. 1983. Heterosis studies in some sorghum cultivars. Sorghum Newsletter 26: 41-42. 1 ref.

Two male-sterile lines and 4 restorer lines were studied. Each male-sterile line was crossed with each restorer line. All hybrids showed heterosis for plant height, stem circumference, panicle girth, and grain yield.

0199 DESAI, K.B., PATEL, R.H., DESAI, D.T., DESAI, R.T.,

and PARIKH, R.K. 1983. Heterobeltiosis for grain and its components in sorghum. Sorghum Newsletter 26: 88. 2 ref.

The study revealed that heterosis for grain yield and other yield contributing characters were significant. The highest heterobeltiosis was registered by 3660A X NSV-13-2 for earhead length and grain yield per plant, 2077A X NSV-13-2 for number of primary branches, and for 100 grain weight.

0200 DESAI, K.B., PATEL, R.H., TIKKA, S.B.S., and KUKADIA, M.U. 1983. Phenotypic stability of some promising genotypes of grain sorghum. Indian Journal of Agricultural Sciences 53(7): 495-497. 9 ref.

Significant genotype-environment interactions were observed in 10 genotypes of grain sorghum evaluated for grain yield at 4 locations in Gujarat, India. Linear component accounted for most of the interactions. High-yielding 'SPV 101' and 'CSH 5' were found to be responsive to better management. 'SPV 115' and 'GJ 108' gave stable yields.

0201 DESHMUKH, R.B. 1983. Combining ability studies on maintainer lines of sorghum. M.Sc. thesis, Punjabrao Krishi Vidyapeeth, Akola, Maharashtra, India. 71 pp.

The characters, studied were: no. of leaves, plant height, leaf area/plant, days to 50% flowering, panicle length, panicle weight, panicle girth, no. of primary branches, grain yield and 1000-grain weight. Variances due to gca and sca for various characters were significant. The higher magnitude of gca variances revealed that additive gene action was dominant for character such as plant height, days to 50% bloom, panicle length, panicle girth, grain yield and 1000-grain weight. For the characters like no. of leaves, days to 50% bloom, gca and sca variances were equal in magnitude, indicating that additive as well as non-additive gene action was equally important in expression of these characters. For leaf area and panicle weight, the variances due to sca were higher, indicating the importance of non-additive gene action. On the basis of gca effects, it is concluded that high heterotic hybrids involved the parents with high x high and high x low gca effects to produce promising hybrids.

0202 DEVADANAM, K., REDDY, C.S., and REDDY, B.M. 1983. Mutational studies in sorghum. 2. Sodium azide induced chlorophyll and morphological mutations in M2 and M3 generations. Andhra Agricultural Journal 30(1): 5-9. 19 ref.

Mutagenic effects of sodium azide using dry and pre-soaked seeds for 4 and 8 h at 4, 8 and 6.4 pH were studied in M2 and M3 generations of 2 local varieties of sorghum in Hyderabad, India. Based on higher frequency and broader spectrum of chlorophyll and morphological mutations, M 36-1 was found to be more mutagen sensitive than Kodali. In general, a higher frequency of mutations were recovered in M2 than in M3, in both the varieties. In M2, viridis mutants occurred in greater frequency followed by albino, chlorina and xantha in M 35-1, while in Kodali, viridis was followed by xantha and chlorina. In M3 generation, viridis mutants were followed by albino, xantha and chlorina in both varieties and a low frequency of striata mutants were recovered only in M 35-1. Low pH, longer duration and presoaking were more effective mutagen treatments in inducing chlorophyll

and morphological mutations in M2 and M3 generations. The frequency of morphological mutants such as leaf type, panicle type, plant height, grassy type, grain and glume type was more in M 35-1 than in Kodali.

0203 DOROFEEV, V.F. 1983. Breeding of early maturing cultivars: problems and parent material. (Ru). Sel'skokhozyaistvennaya Biologiya 10: 12-23.

0204 EL-ATTAR, F.I.H. 1983. Morphogenetical analysis of some quantitative characters in crosses between local and introduced entries of grain sorghum (Sorghum bicolor L. Moench). Ph.D. thesis, Cairo University, Cairo, Egypt. 113 pp. (Summary:Ar).

0205 EL-KADY, A.M.E. 1983. Inheritance of some economic characters in sorghum [Egypt]. M.Sc. thesis, Zagazig University, Zagazig, Moshtohor, Egypt. 212 pp. (Summary:Ar).

0206 ELLSTRAND, N.C., and FOSTER, K.W. 1983. Impact of population structure on the apparent outcrossing rate of grain sorghum (Sorghum bicolor). Theoretical and Applied Genetics 66(3-4): 323-327. 26 ref.

The apparent outcrossing rates of experimental populations of grain sorghum were compared with seed families spatially arranged in stratified and over-dispersed treatments. Using alcohol dehydrogenase allozymes as genetic markers, it was calculated for each of the treatments at 2 locations over 3 years. For all 6 comparisons, the overdispersed treatment yielded significantly larger apparent outcrossing estimates than the stratified treatment.

0207 ELLSTRAND, N.C., LEE, J.M., and FOSTER, K.W. 1983. Alcohol dehydrogenase isozymes in grain sorghum (Sorghum bicolor): evidence for a gene duplication. Biochemical Genetics 21(1-2): 147-154. 26 ref.

Two sets of alcohol dehydrogenase (ADH) bands are regularly observed in grain sorghum: set I is a permanent triplet; set II is variable, as either two or three bands. A faint set III is detected only when extracts from seeds subjected to anaerobiosis are run in neutral pH gels. Dissociation-reassociation experiments revealed that the central band of the set I triplet is a heterodimer of the other two. Full-sib progeny analysis from selfed plants showed that the set II bands are doublets, with heterozygotes having only 3 apparent bands instead of 4 because of the similar mobilities of the fast-migrating isozyme specified by the slow allele and the slow isozyme specified by the fast allele. A three-locus model is proposed as the best explanation of these patterns. Set I consists of the products of two loci and their itergenic heterodimer. Set III is specified by a third locus. Set II isozymes are the intergenic heterodimers of the two set I loci and the set III locus.

0208 FLORES, C.I. 1983. Quantitative genetics of nutritional and agronomic characters in related grain sorghum random-mating populations. Ph.D. thesis, University of Nebraska, Lincoln, Nebraska, USA. 200 pp.

The relationships between nutritional traits and grain yield were studied biometrically. The genetic correlation of yield traits with most nutritional traits were negative. Most nutritional traits were positively correlated with

each other. Direct selection for yield or quality alone did not result in simultaneous improvement in yield and quality traits.

0209 FREY, K.J., COX, T.S., RODGERS, D.M., and BRAMEL-COX, P.J. 1983. Introgression of wild germplasm in oats, barley, sorghum, and pearl millet. Agronomy Abstracts. p. 64.

Oat, barley, sorghum, and pearl millet populations containing 1 to 50% introgressed germplasm from wild relatives were evaluated for productivity traits. High-yielding sorghum introgression lines, as evaluated in India, were also obtained, though in lower frequency.

0210 FU, H.Y. 1983. Variation in mitochondrial translation products and cytoplasmic male sterility in sorghum. (Ch). Acta Genetica Sinica 10(6): 471-476. 11 ref. (Summary:En).

In vitro synthesized mitochondrial proteins with (35S) methionine labeled were isolated by the sodium dodecyl sulfate polyacrylamide gel electrophoresis and autoradiography. The translation products of mitochondia from three cytoplasmic male sterile lines and their maintainer, maternal plant of 3197 A and (3197 A X Baiping) F1 were analysed. Male sterile lines had 2 specific polypeptides more than their maintainer. The molecular weight was 65,000 and 23,000 dalton, respectively. These aberrant polypeptides synthesized by mitochondria of the male sterile lines may be associated with cytoplasmic male sterility. The maternal plant of 3197A and (3197A X Baping) F1 also have these variant polypeptides, but the amount synthesized by mitochondria is less tham male sterile line.

0211 FURLANI, P.R., CLARK, R.B., ROSS, W.M., and MARANVILLE, J.W. 1983. Variability and genetic control of aluminium tolerance in sorghum genotypes. Pages 453-461 In Genetic aspects of plant nutrition (Saric, M.R., and Loughman, B.C., eds.). The Hague, Netherlands: Martinus Nijhoff. 31 ref.

Three genotypes and 12 single-cross hybrids were evaluated for aluminium toxicity. Genotypes ranged from 1.3 - 4.0 and hybrids from 1.6 - 4.0 in their Al toxicity. Ratings were 0 = no Al toxicity symptoms to 4 = severe symptoms.

0212 GALIBA, M. 1983. Analytic report: sorghum breeding during the rainy-season 1982 in Senegal. Dakar, Senegal: Ministere du Developpement Rural. 20 pp.

0213 GALIBA, M. 1983. Heterosis and heterobeltiosis in few cultivars of grain sorghum. (Fr). Bambey, Senegal: Ministere du Developpement Rural. 15 pp.

0214 GALIBA, M. 1983. Sorghum trials by CILIS. Rainy season 1982 in Senegal. (Fr). Bambey, Senegal: Ministere du Developpement Rural. 20 pp.

0215 GILL, K.S. 1983. Genetical research on cereals and millets. Pages 93-138 In Genetical research in India (Jaiswal, P.L., ed.). New Delhi, India: Indian Agricultural Research Institute. 188 ref.

Information of research in India on sorghum breeding is given.

0216 GIRIRAJ, K., and GOUD, J.V. 1983. Association of yield components and developmental traits in grain sorghum. Indian Journal of Agricultural Sciences 53(1): 5-8. 21 ref.

Genotypic correlation coefficients were computed in 8 parents of sorghum and their 28 F1s and F2s. Grain yield was positively associated with days to flower, number of leaves, leaf breadth, leaf area, plant height, panicle breadth, number of whorls, number of primary branches, 100-seed weight and grain number/panicle. Correlation value between seed weight and number of grains/panicle was low. Days to flowering was correlated with developmental traits like leaf number, leaf breadth, leaf area, plant height, stem height and internode length. Plant height showed close association with stem height and internode length, but was negatively correlated with peduncle and panicle length.

0217 GIRIRAJ, K., and GOUD, J.V. 1983. Inheritance studies of vegetative characters in grain sorghum (Sorghum bicolor (Linn) Moench). Genetica Iberica 35(1-2): 87-95. 19 ref.

Inheritance of days to flowering, leaf characteristics and plant height components were studied in F1 and F2 generations of 8 parent diallel cross of sorghum. Based on component analysis and estimate of heritability, days to flowering was found to be predominantly under additive control. Number of leaves, leaf length, leaf breadth, leaf area, plant height, stem height, internode length and peduncle length were found to be governed both by additive and dominant components. Heritability estimates were medium to high for the characters studied. Asymmetry of positive and negative alleles was noticed in parents for all the characters.

0218 GOUD, J.V., and KULLAISWAMY, B.Y. 1983. Present status of linkage groups in sorghum. Page 539 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

During the period 1968-82 the linkage relationship of 49 more genes were established bringing the number of identified genes to 369 and the number of assigned linkage groups to 10.

0219 GU, M.H., MOSHIER, L.J., RODGERS, D.M., and LIANG, G.H. 1983. Interploidy crosses between Sorghum bicolor and its relatives. Agronomy Abstracts. p. 66.

The 30-chromosome F1 progeny from Sorghum x Sorghum halepense were identified and their chromosome behavior was analyzed quantitatively. On average, 9.26 univalents, 7.78 bivalents, 1.70 trivalents and 0.08 quadrivalents were observed per meiocyte. 20.6% of pairing occurred between chromosomes of sorghum and johnsongrass. Four of the six hybrids survived the winter. These hybrids had shorter and thicker rhizomes than those of johnsongrass. 20-chromosome backcross progeny were observed. The chromosomes of 10-chromosome sorghum (S. versicolor, S. stipoideum, S. intrans, S. purpureo) were much larger than those of S. bicolor which indicates that they are distantly related. The chromosomes of S. bicolor and those of S. nitidum (2n=40) and S. halepense were similar in size.

0220 GUPTA, M.P., PANDEY, A.K., and MALLICK, A.S. 1983. Genetics of yield and some quality traits in grain sorghum. Page 541 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford

and IBH Publishing Co.

The nature and magnitude of genetic variances for yield and quality traits were investigated in a 6 parent diallel set in sorghum. There was significant variability among the parents and progenies. The additive and non-additive types of gene actions were important for all the traits. The asymmetrical distribution of positive and negative alleles was observed for all the traits. The dominant genes were more frequent for yield, tryptophan, methionine, and ash content. Protein had positive correlation with methionine, and ash content. Protein had positive correlation with tryptophan and ash content and negative with fat and methionine content. The reciprocal recurrent solution is recommended for improvement of these traits.

0221 HARER, P.N., and BAPAT, D.R. 1983. Line x tester analysis of combining ability in grain sorghum. Journal of Maharashtra Agricultural Universities 7(3): 230-232. 9 ref.

Combining ability effects were studied in a line x tester design experiment involving five male steriles and ten restorers. The combining ability variances due to males, females and hybrids were highly significant for all the characters. Additive gene action was observed for plant height, number of leaves, leaf length, total leaf area, days to 50% flowering, panicle length, width and 1000-grain weight. Whereas non-additive gene action was predominant for leaf width, weight of panicle and total grain yield/plant. The superior combinations involved all the 3 possible combinations between parents for high and low general combining ability effects. The combinations 36 A x 348 and 36A x SC 120 appeared quite promising for characters like grain yield and maturity. The heritability percentage (sq. h) in narrow sense was high for the developmental and panicle characters and was medium for grain yield/plant and 1000 grain weight.

0222 HAWKES, J.G., WILLIAMS, J.T., and CROSTON, R.P. 1983. Sorghum. Pages 220-227 In A bibliography of crop genetic resources. Rome, Italy: IBPGR.

This chapter on sorghum contains 101 references.

0223 HEINRICH, G.M., FRANCIS, C.A., and EASTIN, J.D. 1983. Stability of grain sorghum yield components across diverse environments. Crop Science 23(2): 209-212. 17 ref.

Three stable and three unstable F1 hybrids were evaluated across 14 environments in Nebraska and Kansas, USA to determine the mechanisms important to yield stability. The hybrids differed in yield stability in different environments. High yield potential and stability were not mutually exclusive in the environments tested. Stable genotypes maintained higher levels of all yield components in poor environments. Breeding for more seeds/head and greater seed weights was critical to yield stability. Consistently higher seed weights of stable hybrids contributed to yield and to stability.

0224 HENRY, A., GUPTA, Y.K., and SISODIA, N.S. 1983. Components of grain and dry matter yields in sorghum. Forage Research 9(1): 43-48. 16 ref.

Genetic advance and correlations were studied for grain yield, dry matter yield and their components using 30 genotypes of sorghum. Grain yield was significantly and

positively associated with ear girth, days to maturity, test weight and plant height, while significant negative association was observed with ear length. Dry matter yield was significantly associated with total green weight, leaf weight, stem weight, plant height, leaf length and leaf number. The protein content was not associated with yield. Path coefficient analysis of dry matter yield indicated that green weight and leaf length were the two major characters that directly contributed to the total dry matter production.

0225 HENZELL, R.G., FLETCHER, D.S., and VAN SLOBBE, L. 1983. A recessive mutant for late maturity in 'alpha' grain sorghum. Sorghum Newsletter 26: 81-82. 1 ref.

Studies indicate that the mutant genotype (Q 24) flowers 35-47 days later than the alpha variety irrespective of planting date and QL24's photoperiod response is different from the qualitative response of 'Late KS4' which is late because of its Ma gene genotype. Genetic analysis of the mutant indicated that lateness was due to a recessive gene.

0226 HOLLE, M. 1983. Genetic resources and plant breeding (Phaseolus vulgaris, Zea mays, Capsicum annuum, sorghum). (Es). Serie C, Centro Nacional de Investigaciones Agropecuarias (Venezuela) 5-02: 14-37.

0227 HOOKSTRA, G.H., ROSS, W.M., and MUMM, R.F. 1983. Simultaneous evaluation of grain sorghum A-lines and random-mating populations with topcrosses. Crop Science 23(5): 977-981. 22 ref.

Based on GCA effects, A-line N37 and population RP1R were superior parents for producing high yielding topcrosses. The SCA yield effects were significant in only eight topcrosses. N37 X RP1R had the highest yield, but its SCA effect was nonsignificant. Topcrosses appear to be suitable for preliminary evaluation of grain sorghum germplasm. They identify superior A-lines and identify populations in which to initiate inbreeding to develop R-lines.

0228 ICRISAT. 1983. Genetic Resources Unit. Pages 1-15 In Annual report 1982. Patancheru, Andhra Pradesh, India: ICRISAT.

This chapter includes information on sorghum germplasm collections at ICRISAT.

0229 IUSHCHENKO, S.I. 1983. Sterile lines of broom corn. (Ru). Biulleten', Vsesoiuznyi Institut Rastenievodstva 128: 29-31.

0230 JIMENEZ CORDERO, A.A., and CASAS SALAS, J. 1983. Relationship between general combining ability, yield and yield components of B-lines. Sorghum Newsletter 26: 94.

The experiment was located at Celaya, Mexico on 4 groups of B-lines. The group of late high GCA lines had high yields due to a high number of grains per panicle, and also to a high number of primary branches. The late high GCA lines had a larger sink than the medium and low GCA groups. The source was also superior in the high GCA group. The grain filling period was longest in the late high GCA lines. GCA seems to be associated with high grain yield and yield components.

0231 JIMENEZ CORDERO, A.A., and MENDOZA ONOFRE, L.E. 1983. Agronomic and physiotechnical characteristics of lines and hybrids of sorghum (Sorghum bicolor (L.) Moench). (Es). Agrociencia

51: 163-175. 19 ref. (Summary:En).

Thirty A lines, their corresponding maintainers B lines, 30 R lines and 4 sorghum hybrids were evaluated in 6 experiments established in the main sorghum producing areas in Mexico. Correlations between agronomic and crop physiology indexes, and grain yield were computed. The results indicated that: a) the principal grain yield components were seed weight, grains per panicle, panicles per sq. m, and longer grain filling period; b) B lines reached physiological maturity earlier and were more efficient in grain production than R lines; c) A and B lines were similar in easily measurable characters but not in those difficult to measure; d) ample variation in characters was found within each group of lines and e) environment had a great influence in all characters expression.

0232 JIMENEZ CORDERO, A.A., MENDOZA ONOFRE, L.E., and CARBALLO CARBALLO, A. 1983. The stability of agronomic, physiological and technical characteristics of lines and hybrids of sorghum (Sorghum bicolor (L.) Moench). (Es). Agrociencia 51: 155-162. (Summary:En).

Stability parameters were determined in 30 B, and 30 R sorghum lines for the following characters: dry matter production at flowering and at harvest time, days to bloom and to physiologic maturity, plant height, exsertion, tillers per plant, seed weight, panicle number, leaf number at bloom, grain yield and harvest index. The same characters were measured in 4 hybrids and their parents. It was concluded that grain yield, plant height, and days to physiologic maturity stabilities were due to plasticity in their individual components or in a complemental one. Hybrid stability for dry matter at harvest, days to bloom, days to physiologic maturity, plant height and leaf number at bloom required both parents to be stable for those characters.

0233 JORDAN, W.R., MONK, R.L., MILLER, F.R., ROSENOW, D.T., CLARK, L.E., and SHOUSE, P.J. 1983. Environmental physiology of sorghum. I. Environmental and genetic control of epicuticular wax load. Crop Science 23(3): 552-558. 22 ref.

The effects of genotype and environment on the epicuticular wax (EW) load on sorghum leaves were studied in a series of field experiments between 1976 and 1981 at Texas, USA. Entries in the tests were normal, bloom-type sorghums and represented a range of lines and hybrids. Leaf samples were collected near anthesis, EW was extracted with chloroform, and quantities of EW were estimated by a colorimetric method. Significant variability in average EW loads occurred among genotypes and among years. EW loads increased under hot, dry conditions, but wax loads were not closely related to seasonal rainfall. General combining abilities of both males and females were significant, but specific combining ability effects were not significant. The portion of the genetic variance contributed by females was 73% while the males contributed 27%. Genetic stability for EW load across environments also varied.

0234 KEBEDE, Y., and MILLER, F.R. 1983. Growth analysis of old and new sorghum hybrids. Sorghum Newsletter 26: 46-47.

New hybrids reached physiological maturity 5 days later than the old. New hybrids had higher total plant dry weights at all stages than both

the old or the new/old group. It appears that yield gains for new hybrids have been achieved partly from increases in days taken to reach various physiological stages but primarily from higher growth rates.

0235 KEIM, K.R., MILLER, F.R., and ROSENOW, D.T. 1983. Natural selection under diverse environments for monogenic traits in a sorghum composite. Agronomy Abstracts. p. 69.

A composite cross of sorghum was grown in 4 environments to the F7 generation. Environments varied from semi-arid dryland to humid rainfed with respect to water availability. The presence of awns was at a selective advantage only in the semi-arid, dryland environment. Presence of a seed testa, red pericarp, and two linked traits, juicy midrib and purple plant color, were at a selective advantage in all environments. Results indicate alternative forms of monogenically inherited traits are subject to differential selection pressure in divergent environments.

0236 KEIM, K.R., ROSENOW, D.T., MILLER, F.R., and QUISENBERRY, J.E. 1983. Differential survival of genes in a composite cross of sorghum. Crop Science 23(4): 781-784. 24 ref.

A composite-cross population, grown to the F7 generation under nonirrigated field conditions at Texas, USA was evaluated for the effect of natural selection on the expression of six simply inherited plant and grain traits in sorghum. Results indicated that endosperm type was not affected by natural selection. Genes producing awns, red pericarp color, and presence of a seed testa were at a selective advantage. The linked traits of midrib juiciness and plant color, indicated that midrib color was not subject to natural selection, but tan plants were at a selective disadvantage. Data presented indicate which of the traits studied are advantageous in a semi-arid environment.

0237 KHANNA-CHOPRA, R., and SINHA, S.K. 1983. Genetic analysis of photosynthetic potential in relation to heterosis in maize and sorghum. Page 378 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. New Delhi, India: Oxford and IBH Publishing Co.

Photosynthetic potential was analysed in terms of photosynthesis rate and leaf area development. Leaf area development was faster in heterotic hybrids even in 7 day old seedlings. Photosynthetic rate did not differ significantly between heterotic hybrids and their parents.

0238 KHIDSE, S.R., BHALE, N.L., and BORIKAR, S.T. 1983. Combining ability for seedling vigour in sorghum. Journal of Maharashtra Agricultural Universities 8(1): 59-60. 5 ref.

A line x tester analysis in sorghum revealed predominance of non-additive gene action for seed size and seedling vigour characters. The 36 A and M.35-1 are desirable combiners for seed size. The 36 A among male steriles and PD 3-1-11, IS-84, 168 and M.35-1 among restorers are good combiners for seedling vigour characters.

0239 KHIDSE, S.R., BHALE, N.L., and BORIKAR, S.T. 1983. Leaf-water deficit in sorghum hybrids and their parents. Indian Journal of Agricultural Sciences 53(5): 289-291. 3 ref.

The leaf-water deficit (LWD),

both before and after stress, at panicle initiation, panicle emergence and grain maturation were studied in 10 hybrids of sorghum and their 7 parents. The differences for LWD in the genotypes were more pronounced in stress situation, particularly at panicle emergence. At panicle initiation, no genotype was superior to the check, 'M 35-1'. Parent '285' and hybrids '1202 A' X 'PD 3-1-11' and 'CK60A' X 'PD 3-1-11' were superior to the check at panicle emergence. The male-sterile '1202 A' and restorers 'PD 3-1-11' and '168' had desirable drought resistance at grain maturation. The use of '285', '168' and 'M 35-1' in breeding programme might be useful in evolving promising varieties of winter sorghum.

0240 KIRTI, P.B., and MURTY, U.R. 1983. Chromosomal differentiation between cross sterile and cross fertile sorghum lines. Cereal Research Communications 11(2): 149-151. 2 ref.

Two cross sterile lines R473 and I02, one cross fertile line, and four F1 hybrids were studied for chromosome pairing. Chromosome nonhomologies was associated with cross sterility. Cross sterility was also caused by chromosomal imbalances and extra heterochromation.

0241 KIRTI, P.B., and MURTY, U.R. 1983. Induction of obligate apomixis in sorghum. Page 298 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. New Delhi, India: Oxford and IBH Publishing Co.

The efficiency of chemical and physical mutagens was studied in altering the frequency of apomixis, which was estimated through progeny tests. Frequency of apomixis was reduced in the M1 generation. However, there was an increase in the M2 of 20KR gamma ray treatment. Some individual M2 plants were found to be giving maternals to the extent of 100% in progeny tests.

0242 KNAPP, S.J., ROSS, W.M., and STROUP, W.W. 1983. An exact confidence interval for heritability on a progeny mean basis. Hort Science 18(4 sec. 2): 598. (Abstract).

0243 KUKADIA, M.U., DESAI, K.B., DESAI, M.S., and PATEL, R.H. 1983. Hybrid vigor in promising crosses of sorghum. Sorghum Newsletter 26: 38-39.

Eighteen crosses from 3 females and 6 males using a line x tester mating system were evaluated for hybrid vigour at the Sorghum Research Station, Surat, India. Heterosis expressed over mid-parent and better parent in desired for days to 50% bloom, plant height, days to maturity, ear circumference, ear length, no. of primaries, no. of secondaries, 1000-grain weight and grain yield/plant are presented. Three crosses exhibited significant relative heterosis and 6 crosses showed significant heterosis for grain yield.

0244 KUKADIA, M.U., DESAI, K.B., DESAI, M.S., PATEL, R.H., and GUPTA, V.K. 1983. Line X tester analysis for combining ability in sorghum. Gujarat Agricultural University Research Journal 9(1): 5-10. 25 ref.

Two-factor mating design using line x tester analysis was adopted involving 4 male-steriles as lines and six pollen-parents as testers. Both additive as well as non-additive gene effects were important for inheritance of grain

yield. 2219 A and IS 370 were good combiners for yield.

0245 KUKADIA, M.U., DESAI, K.B., DESAI, M.S., PATEL, R.H., and RAJA, K.R.V. 1983. Estimates of heritability and other related genetic parameters in sorghum. Sorghum Newsletter 26: 31-32. 3 ref.

Results revealed that no. of primaries and grain yield per plant showed high magnitude of expected genetic advance expressed as percentage of the mean accompanied by high heritability values. All the remaining characters showed high heritability with low expected genetic gain indicating that high heritability estimates may not necessarily mean an increased genetic advance in all cases.

0246 KUKADIA, M.U., DESAI, K.B., DESAI, M.S., PATEL, R.H., and RAJA, K.R.V. 1983. Heterosis in advanced sorghum hybrids. Sorghum Newsletter 26: 34-35. 2 ref.

Ten hybrids along with check hybrids were evaluated at Sorghum Research Station, Surat, India for their yield potential. Significant variation for all the characters except no. of secondaries/primary were observed among hybrids. Significant correlation was observed between days to 50% bloom and no. of primaries/panicle, plant height with panicle circumference and panicle weight with no. of secondaries/primary. Panicle length was not significantly correlated with any of the characters. Breeding of genotypes having wider and heavier panicles carrying more primaries and secondaries are recommended for better grain yield.

0247 KUKADIA, M.U., DESAI, K.B., DESAI, M.S., PATEL, R.H., and RAJA, K.R.V. 1983. Line x tester analysis in sorghum. Sorghum Newsletter 26: 35-36. 2 ref.

The experiment material consisted of 18 single crosses using 3 lines and 6 testers. Analysis of variance for parents and hybrids for 9 characters are given. Analysis of variances for combining ability revealed significant differences for all the characters among crosses except primaries and secondaries. Additive gene action was observed for days to flowering and maturity. All other characters showed non-additive gene action.

0248 KUKADIA, M.U., DESAI, K.B., DESAI, M.S., PATEL, R.H., and RAJA, K.R.V. 1983. The genetic analysis of some quantitative characters in grain sorghum. Sorghum Newsletter 26: 37.

Five parental lines and their 10 single crosses, excluding reciprocals were evaluated for yield components at Sorghum Research Station, Surat, India. Epistasis was identified for grain yield as regression coefficient deviated from unity. Correlation between parental measurements and the order of dominance were positive but non-significant for days to 50% bloom, plant height, days to maturity, and ear circumference. The correlations were negative for the other traits.

0249 KUKADIA, M.U., DESAI, K.B., DESAI, M.S., PATEL. R.H., and RAJA, K.R.V. 1983. Genetic component analysis in sorghum. Sorghum Newsletter 26: 32-33. 2 ref.

A five-parent diallel analysis was made to improve grain yield. The analysis of variance revealed significant difference among parents for days to 50% bloom, plant height, days to maturity, no. of primaries/ear and no. of

secondaries/ear. The additive component was significant for days to 50% bloom, plant height, days to maturity, and no. of primaries/ear. The dominance components were significant for all the characters except ear circumference, no. of secondaries/primary, and grain yield. The ratio of dominant to recessive genes suggested more dominant genes for all characters except ear circumference and no. of primaries/ear and equal proportions for days to 50% bloom.

0250 KUKADIA, M.U., DESAI, K.B., DESAI, M.S., RAJA, K.R.V., and PATEL, R.H. 1983. Path analysis in genetic collection of sorghum. Sorghum Newsletter 26: 83-84. 2 ref.

Path analysis revealed that fodder yield, breadth of panicle and flag leaf area had positive direct effect toward grain yield. Length of panicle primaries and days to flowering showed negative and negligible direct as well as indirect effects for grain yield. The direct effect of fodder yield exceeded its correlation coefficient value with grain yield indicating its greater role in yield improvement. Plant height did not contribute as much for grain yield.

0251 KULLAISWAMY, B.Y. 1983. Linkage studies in sorghum (Sorghum bicolor (L.) Moench). Mysore Journal of Agricultural Sciences 17(2): 189-190. (Abstract).

0252 KULLAISWAMY, B.Y., and GOUD, J.V. 1983. Genetic association between two panicle characters in sorghum. Current Science 52(2): 93-94. 8 ref.

Interrelationship of panicle shape and panicle density was studied in crosses between the lines IS8744 and IS1134. Oval and loose panicles showed dominance over spindle and compact panicles. Panicle shape controlling gene Op and panicle density controlling gene Pa1 were linked in the fourth linkage group.

0253 KULLAISWAMY, B.Y., and GOUD, J.V. 1983. Inheritance and linkage in sorghum. Madras Agricultural Journal 70(12): 789-793. 13 ref.

The nature of inheritance of 6 contrasting characters was studied in the sorghum cross SB-1066 x IS-1202. The linkage relationship of five loci was established. With the addition of three new loci, the number of mapped genes on the second linkage group is raised from 14 to 17.

0254 KULLAISWAMY, B.Y., and GOUD, J.V. 1983. Inheritance and linkage relationship of three peduncle characters in sorghum. Indian Journal of Genetics and Plant Breeding 43(3): 306-310. 5 ref.

Three characters, peduncle inclination, peduncle smoothness and peduncle curvature were studied in an intervarietal cross in sorghum, SB 1066 X IS 1515. Trihybrid ratio of 15:49 was postulated for the first two characters. A ratio of 3:61 was fitted for the third character. The factors I-Er and I-Wy showed genetic association with a recombination value of 25.84 map units, which were placed in the second linkage group. It is concluded that the characters--peduncle smoothness and peduncle curvature are governed by three different pairs of genes and no environmental factors are involved.

0255 KULLAISWAMY, B.Y., and GOUD, J.V. 1983. Inheritance and linkage relationship of three qualitative characters in sorghum.

Current Science 52(3): 132-135. 6 ref.

A cross was made between the lines SB1066 and IS873 to study the linkage relationships of internode covering, dry glume colour and panicle dropping. Internode covering was controlled by 3 complementary genes Lt1, Lt2 and Lt3. The glume colour was controlled by the gene Cg and 3 complementary inhibitors and the panicle characters was controlled by complementary genes, Pdr1, Pdr2 and Pdr3. Lt1, Pdr1 and Cg were linked in the second linkage group.

0256 KULLAISWAMY, B.Y., and GOUD, J.V. 1983. New genes for awning in sorghum (Sorghum bicolor (L.) Moench). Madras Agricultural Journal 70(6): 355-359. 10 ref.

The inheritance of awning in sorghum was studied in six cross combinations viz., 148 x M35-1, BJ105 x IS3691, Is1066 x IS873, SB1066 x IS1202, IS8744 x IS887 and IS8744 x IS1134. Monogenic to trigenic F2 ratios were realised. The gene action involved is discussed.

0257 LAZANYI, J., PAPP, S., and KOVACS, J. 1983. Study of inheritance of quality characters by diallel crossing of cytoplasmic male-sterile lines. Sorghum Newsletter 26: 3-4.

The investigations revealed the importance of overdominance in leaf length and forage and grain yield. The degree of average dominance was less than 1.0 for the other characters studied. Plant height was governed by 2-3 genes, leaf length by 3-4 genes, stalk mass by 2-3 genes, and grain mass by 3-4 genes. Highest inheritance was observed for leaf number and plant height. The largest heterosis effect was noticed between the characters associated with grain yield and stalk yield. Highest additive gene effect was observed in the inheritance of stalk yield and leaf number based on VGCA/VSCa values.

0258 LEAVER, C.J., HACK, E., DAWSON, A.J., and ISAAC, P.G. 1983. Mitochondrial genes and their expression in higher plants. Journal of Cellular Biochemistry 7(part B): 262. (Abstract).

0259 LI, Z.X., HOU, Z.F., WEI, Y.B., and DUAN, Q.G. 1983. Heterosis for radicle development in hybrid sorghum and its use in seed production. (Ch). Shanxi Agricultural Science 11: 16-17.

0260 LINN, C.J.K., HASKINS, F.A., and GORZ, H.J. 1983. Azide-induced variation in chlorophyll content and nitrate reductase activity in sorghum. Sorghum Newsletter 26: 96. 2 ref.

Bulked samples of M2 and of control seeds were planted in growth chambers to determine the frequency of chlorophyll-deficient seedlings in each population. Azide appeared to be an effective mutagen for sorghum. The nitrate reductase assay was modified and used to screen progenies of individual M1 and control plants. Significant variation was found in both types of progeny, but the difference between the 2 types was less than that had been expected on the basis of the chlorophyll deficiency results.

0261 LIU, Z.C., LI, J.G., LUO, H.X., and CHEN, F.T. 1983. Studies on the ribulose bisphosphate carboxylase and cytoplasmic male-sterility. Acta Genetica Sinica 10(1): 36-42. 12 ref.

Ribulose bisphosphate carboxylase (RuBPCase) in spinach, cabbage, corn, sorghum, wheat and rice was

isolated and purified on the Sephadex Column. Electrophoresis of the samples obtained by this method indicated one unique band of this enzyme. Activity of RuBPCase was determined with NaH 14CO2 by the liquid scintillation spectrometer method. The activity of RuBPCase in male-sterile lines of tested crops was higher than that of their maintainers indicating an association between RuBPCase and the cytoplasmic male-sterility.

0262 LOTHROP, J.E. 1983. Variability for yield and yield components in the IAP1R grain sorghum random-mating population. Ph.D. thesis, Iowa State University, Ames, Iowa, USA. 135 pp.

Genetic correlations with grain yield/unit area were highest for seeds/panicle. The coefficients were low for panicles/plant and 100-seed weight. Phenotypic correlations of grain yield/unit area were positive with height and maturity. Gridded mass selection was estimated to be the most effective procedure for improving seed size. S1 testing seemed preferable for improvement of grain yield, seeds/panicle, and panicles/plant. Selection for yield components was estimated to be less effective than direct selection for grain yield.

0263 MA, Z.T. 1983. Selection of early lines after irradiation of the sorghum cultivar 7512, a yellow endosperm type. (Ch). Application of Atomic Energy in Agriculture 4: 11-14.

Two lines with early maturity and yellow endosperms were selected after 8 generations from sorghum cv. 7512 and irradiated with gamma rays. Both lines had improved agronomic characteristics and grain quality and could be used as restorers.

0264 MALI:MINISTERE DE L'AGRICULTURE, SECTION DE RECHERCHES SUR LES CULTURES VIVRIERES ET OLEAGINEUSES. 1983. Results of the experimentation programme in 1982 and of the regional project in improving millets, sorghums, cowpeas, and maize [Mali]. Bamako, Mali: Institut d'Economie Rurale. 48 pp.

0265 MALYUZHENETS, N.S. 1983. Effect of climatic conditions of the year on the efficiency of evaluating commercially valuable characters in grain sorghum. (Ru). Doklady Vsesoyuznoi Ordena Lenina i Ordena Trudovogo Krasnogo Znameni Akademii Selskokh Ozyaistvennykh Nauk Imeni V I Lenina 3: 42-43.

0266 MATTHEWS, R.V. 1983. Effect of heterosis, cytoplasm type, and seed source on seedling cold tolerance in grain sorghum. Ph.D. thesis, University of Nebraska, Lincoln, Nebraska, USA. 105 pp.

Genetic factors and seed quality traits involved in seedling cold tolerance were investigated in Nebraska, USA. Stand counts, a visual rating for vigor, and average dry wt. of plants harvested at the ten leaf stage were observed. Heterosis was strongly expressed for all traits. Cytoplasmic and nuclear interactions accounted for different cold responses in only a few genotypes. The visual rating variable correlated well with average dry weight and plant counts. There was no relationship between covering of panicles during grain filling period and seed cold tolerance.

0267 MENDOZA ONOFRE, L.E., and HERNANDEZ LIVERA, A. 1983. Lines per se yield as an estimate of general combining ability.

Sorghum Newsletter 26: 41.

All possible single crosses among 12 female and 18 male lines were made, and the 216 resulting hybrids plus the 30 parents were evaluated. Correlations values for the first, second, and third sets were 0.60, 0.75 and 0.61, respectively. These results suggest that yield of the parents per se could be an initial selection criterion for GCA.

0268 MENDOZA ONOFRE, L.E., ORTIZ CERECERES, J., and OSUNA ORTEGA, J. 1983. Agronomical, crop physiologial and dry matter distribution characteristics of cold-tolerant genotypes. Sorghum Newsletter 26: 41.

In cold tolerant sorghum genotypes more than 50% of the genotypes showed increased dry matter accumulation in leaf sheaths and stems during the grain filling period, and although days to bloom were different among genotypes, the length of the grain filling period was relatively the same among them.

0269 MENGESHA, M.H., RAO, K.E.P., and RAO, S.A. 1983. Evaluation of sorghum and pearl millet germplasm at ICRISAT. Page 447 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

The world collection of sorghum consisting of 22466 accessions were evaluated in terms of the IBPGR/ICRISAT descriptors. Considerable variation was observed for various morphological and agronomical characters. The germplasm was also screened for resistance to insect pests and diseases. It was observed that wild progenitors have changed in morphological and physiological characters to adapt themselves to the local ecological conditions. Photoperiod-sensitivity, inflorescence size and number and grain number and size were the major changes of evolutionary significance.

0270 MOHAMED, A.B. 1983. Evaluation of improvement in sorghum random-mating population NP3R using S1 family testing vs. testcrossing to an inbred line. Ph.D. thesis, University of Nebraska, Lincoln, Nebraska, USA. 91 pp.

Recurrent selection in improving sorghum populations through intrapopulation (S1) and interpopulation (S1 x tester) methods was realized and expected gains in yield manifested the superiority of S1 family testing over S1 testcrossing investigated. The superiority of S1 family testing was an indication of the prevalence of additive and additive x additive types of gene action in sorghum populations. The phenotypic and genetic correlations among characters indicated the positive association of yield with bloom and height and a negative correlation of yield with oil and protein.

0271 MUKURU, S.Z. 1983. Breeding, selection and evaluation of sorghum at the international level. Presented at the Sorghum Breeding Workshop for Latin America, 10-16 April 1983, CIMMYT, Mexico. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0272 MURTY, D.S., NICODEMUS, K.D., PATIL, H.D., MUKURU, S.Z., and HOUSE, L.R. 1983. Studies on popping quality in sorghum. Sorghum Newsletter 26: 97-99. 2 ref.

The study on association of some grain characters with popping quality and the inheritance of

popping quality revealed that popping volume is a heritable character controlled by polygenes.

0273 MURTY, U.R., KIRTI, P.B., and RAO, N.G.P. 1983. Fixation of heterosis in crop plants with special reference to sorghum. Pages 5-6 In Precongress Scientific Meeting on Genetics and Improvement of Heterotic Systems. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

Progenies obtained from 2 apomictic crosses were intermediate in character between F1 hybrids and pure line varieties. Stability in yield of the progenies was achieved by selecting plants that resembled F1 hybrids.

0274 MURTY, U.R., KIRTI, P.B., SRIDHAR, P., and BHARATHI, M. 1983. Genetic markers for the detection and estimation of apomixis in Sorghum bicolor L. Moench. Sorghum Newsletter 26: 85-86. 9 ref.

It is suggested that tan plant character be used in estimation of apomixis in breeding experiments and the shrivelled grain character in quick estimations in basic studies aimed at achieving obligate apomixis.

0275 MURTY, U.R., KIRTI, P.B., SRIDHAR, P., and BHARATHI, M. 1983. Genetic markers to detect apomixis in Sorghum bicolor L. Moench. Current Science 53(1): 49-51. 9 ref.

Tan plant colour and shrivelled seed are used to detect and estimate apomixis. It is suggested to use tan plant character in estimations of apomixis in breeding experiments and the shrivelled grain character in quick estimations in basic studies aimed at achieving obligate apomixis.

0276 NANDANWANKAR, K.G., SHINDE, V.K., and AMBEKAR, S.S. 1983. Correlation studies in bold grain selections. Sorghum Newsleter 26: 18.

Results revealed that grain yield was significantly positively correlated with panicle girth and 100-grain weight whereas negatively correlated with days to 50% flowering.

0277 NANDANWANKAR, K.G., SHINDE, V.K., AMBEKAR, S.S., and PIMPRIKAR, Y.K. 1983. Heterosis and combining ability in 6 x 6 diallel of improved kharif sorghum varieties. Sorghum Newsleter 26: 20.

Combining ability analysis revealed that SPV-346 was a good general combining parent with high positive significant g.c.a. effect followed by SPV-224. It was evident that both the general combiners would throw better heterosis in F1 hybrids, hence, it can be expected that the crosses between SPV-246 and SPV-224 would produce high yielding genotypes in segregating generations like the F2 and F3.

0278 NAYEEM, K.A., and BAPAT, D.R. 1983. Phenotypic stability for protein, lysine and sugars in grain sorghum. Page 383 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 1. New Delhi, India: Oxford and IBH Publishing Co.

Phenotypic stability of 18 diverse parents and their 80 hybrid combinations in a 8 x 10 line x tester mating system was studied under 4 environments. The main effects as well as both the components of genotype x environment interaction were significant for all the quality

traits. For lysine content, 7 hybrids exhibited average stability, while 3 hybrids displayed average stability for sugar contents. Heterozygote advantage was not observed in most of the combinations for quality characters.

0279 NIANGADO, O., TOURE, A., and SCHEURING, J.F. 1983. The improvement of sorghums: document presented during the meeting on the improvement of sorghums in the Sahel. (Fr). Bamako, Mali: Institut d'Economie Rurale. 18 pp.

0280 NOUR, A.M. 1983. Plant breeding [sesame, sorghum, Kenana, Sudan]. Pages 50-59 In Annual report, 1978-1979. Kenana, Sudan: Kenana Research Station.

0281 O'NEILL, M.K., HOFMANN, W., DOBRENZ, A.K., and MARCARIAN, V. 1983. Drought response of sorghum hybrids under a sprinkler irrigation gradient system. Agronomy Journal 75(1): 102-107. 23 ref.

Fifty sorghum hybrids from A-lines 'CK-60' and 'Redlan' were planted perpendicular to the mainline of the sprinkler irrigation gradient system at Arizona, USA in 1979 and 1980. The soil was a superstition sand with an average available soil moisture of 3.6%. Hybrids developed with CK-60 were able to produce seed-producing panicles in drier areas of the gradient compared to hybrids developed with Redlan. The average distance from the sprinkler line source was 14.4 m for CK-60 hybrids and 11.3 m for Redlan hybrids over both years. Days to anthesis, panicle and peduncle length of plants in the stressed area of the gradient may be potential indicators of drought resistance. The irrigation gradient system is a useful tool for evaluating drought resistance and the selection of parental lines over a wide range of available soil moisture conditions.

0282 PALANISAMY, S., PRASAD, M.N., VIJAYAKUMAR, S., and RANGASAMY, S.R. 1983. Heterotic effects of new male-sterile lines in sorghum and their combining ability. Pages 7-8 In Precongress Scientific Meeting on Genetics and Improvement of Heterotic Systems. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

Heterotic effects for higher grain yield and earliness were tested in 7 cytoplasmic male sterile lines crossed with 3 restorer lines.

0283 PAMBRUN, J., and PRADEL, J. 1983. Grain sorghum: earliness as much as quality. (Fr). France Agricole 1972: 36-37.

0284 PATEL, R.H., DESAI, K.B., and DESAI, S.P. 1983. Heritability estimates in grain sorghum. Sorghum Newsletter 26: 89-90. 7 ref.

The results of heritability estimate through different methods indicate that selection through panicle length and 100 grain weight would be most effective for further improvement of yield.

0285 PATEL, R.H., DESAI, K.B., and RAJA, K.R.V. 1983. Phenotypic stability of elite types of sorghum. Sorghum Newsletter 26: 13-14. 5 ref.

Eighteen elite types of sorghum, including the cultivated GJ 108, were tested at Gujarat Agricultural University, Navsari, India. Pooled analysis of variance revealed that the genotype-environment interaction was significant for grain and fodder yield. The variance due to linear regression

mainly accounted for the genotype environmental interactions. The genotype M50 was considered as a stable genotype for grain yield.

0286 PATEL, R.H., DESAI, K.B., DESAI, D.T., DESAI, R.T., and PARIKH, R.K. 1983. Line x tester analysis for combining ability of new restorers in grain sorghum. Sorghum Newsleter 26: 12-13. 3 ref.

To estimate the potentialities of some new sorghum lines, 5 male-sterile lines were crossed with 16 pollinators and the resulting crosses were evaluated at AICSIP, Navsari, India during 1981-82. Additive gene action was dominant in the characters studied. The highest specific combining ability was recorded in the combination of 296A x M67 wherein both the parents had high general combining ability for no. of primary branches and grain yield per plant, indicating additive x additive interaction responsive for high heterosis.

0287 PATEL, R.H., DESAI, K.B., DESAI, D.T., RAJA, K.R.V., and DESAI, R.T. 1983. Association and path analysis for panicle characters in sorghum. Sorghum Newsletter 26: 88-89.

Study showed that of all the characters, number of grains per plant and earhead length had a significant role due to their direct influence on yield.

0288 PATEL, R.H., DESAI, K.B., PARIKH, R.K., DESAI, D.T., and DESAI, R.T. 1983. Directional selection in advance generation progenies of grain sorghum. Sorghum Newsletter 26: 15-16. 2 ref.

F5 and F6 generations of 3 crosses, their parents, and one check were studied during 1980-81 at the AICSIP, Navsari, India. Grain yields of 3 F6 families were higher than that of F5 families and check. Regression of F6 on F5 suggested that the F5 itself was good indicator of F6 performance for days to 50% bloom and 100-grain weight. The regression coefficient was positive and significant for days to 50% bloom, plant height, and 100-grain weight indicating that selection between families based on these characters stabilized quickly.

0289 PATEL, R.H., DESAI, K.B., PARIKH, R.K., DESAI, D.T., and KUKADIA, M.U. 1983. Genotype x environment interaction for blooming in sorghum. Sorghum Newsletter 26: 16.

Analysis indicated that 296A, M35, and M50 were stable for days to flowering under different environments as these genotypes registered linear regression coefficients nearing unity with negligible non linear components. The genotype 2077A showed high linear regression with a high S2d indicating a highly photo- and thermo- sensitive genotype for their character. M13 recorded a low bi and was suitable for unfavourable conditions. Thus, 296A as female and M35 and M50 as males were highly stable for blooming behaviour.

0290 PATEL, R.H., DESAI, K.B., PARIKH, R.K., RAJA, K.R.V., and PATEL, K.K. 1983. Effect of rainfall on seed set in male-sterile lines of sorghum. Sorghum Newsletter 26: 10. 1 ref.

The study revealed that the production of the male-sterile line was intimately connected with rainfall received during the period of fertilization in the crop.

0291 PATEL, R.H., DESAI, K.B., TIKKA, S.B.S., and RAJA, K.R.V. 1983. Heterosis and

inbreeding depression in sorghum. Gujarat Agricultural University Research Journal 8(2): 121-124. 5 ref.

Data on heterosis relative to the midparental value and inbreeding depression for grain yield and 4 related characters in crosses between 3 female parents and 8 male parents are tabulated. The highest-yielding hybrids showed high heterosis for panicle length and 100-grain weight. The most heterotic F1 hybrids showed the most inbreeding depression in the F2.

0292 PATIL, R.C., and THOMBRE, M.V. 1983. Genetic parameters, correlation co-efficients and path analysis in F1 and F2 generations of a 9 x 9 diallel cross of sorghum. Journal of Maharashtra Agricultural Universities 8(2): 162-165. 8 ref.

High heritability was noticed for vegetative and reproductive traits studied in sorghum, both in F1 and F2. High genetic advance and expected genetic gain were observed for plant height, total leaf area, and grain yield. The direct effect of panicle weight on grain yield was the highest. Moderately high direct effects of plant height in F1 number of secondaries in F2 and 1000 grain weight in F2 were noticed. The indirect effects of all the components, except panicle length and girth on grain yield via panicle weight were positive and high both in F1 and F2. There was a strong association of plant height, no. of leaves, total leaf area, days to 50 percent flowering , no. of primaries and secondaries, panicle weight and 1000 grain weight with grain yield. It is suggested to consider the said components in making selections in further generations.

0293 PATIL, R.C., and THOMBRE, M.V. 1983. Inter-relationship between yield and some agronomic characters in a 4 x 5, line x tester, cross set in sorghum. Sorghum Newsletter 26: 27.

The genotypic correlation coefficients were highly significant for 18 out of 21 character pairs. Plant height, panicle length, no. of primaries and secondaries, panicle weight, and 1000-seed weight, showed strong association with grain yield, however, the direct effects of plant height, panicle length, and no. of secondaries on grain yield were negative. The negative direct effect and negligible direct effect of 1000-seed weight was due internal cancellation of these components on grain yield.

0294 POCHOLK PONGPANICH. 1983. Combining ability and heterosis in F1 grain sorghum hybrids. (Thai). M.S. thesis, Kasetsart University, Bangkok, Thailand. 108 pp. 58 ref. (Summary:En).

0295 PREST, T.J., CANTRELL, R.P., and AXTELL, J.D. 1983. Heritability of lodging resistance and its association with other agronomic traits in a diverse sorghum population. Crop Science 23(2): 217-221. 7 ref.

Random advanced lines from sorghum population, PP9, were used to partition the genotypic variances of lodging resistance and other agronomic traits into components due to additive and additive x additive genetic effects. In addition, heritabilities, phenotypic and genetic correlations between characters, and expected gains from S1 progeny selection were calculated. The characters evaluated were stalk lodging, thickness of third-internode rind, diameter of third internode,

flowering, and grain yield. All characters except lodging (post-frost) and yield were significantly correlated with flowering. When flowering within years was used as a covariate, heritabilities did not change appreciably.

0296 PRING, D.R. 1983. Mitochondrial DNA plasmids and cytoplasmic male sterility. Pages 55-63 In Genetic engineering: applications to agriculture (Owens, L.D., ed.). London, UK: Granada Publishing. 34 ref.

Plasmid-like linear or circular mitochondrial DNAs have been found in fertile and cytoplasmic male-sterile maize and sorghum, ranging in size from ca. 1 to 8 kilobase pairs (kbp). Linear molecules of 6.4 and 5.4kbp are associated with one source of male sterility in maize, and linear molecules of 5.7 and 5.3 kbp are found in one source in sorghum. Hybridization experiments indicate limited homology between the maize and sorghum plasmid-like DNAs. Smaller molecules are also associated with sources of male sterility in maize, and are found in male-sterile sorghum.

0297 QUINBY, J.R. 1983. Looking for a fifth cytoplasm in sorghum. Sorghum Newsletter 26: 96.

The 2 female-inducing cytoplasms, one male-inducing cytoplasm and the neutral cytoplasm have been recognized. The recognition of the second male-inducing cytoplasm or the fifth cytoplasm will be of interest since strains in that cytoplasm would be genetically msc1 msc2 and would be male-sterile in Kafir or B cytoplasm. It may be possible to have agronomically suitable female parents in Kafir, or B, cytoplasm as well as in A, A2, and A3 cytoplasms.

0298 RAAB, Q.J., MILLER, F.R., and ROONEY, L.W. 1983. Relationship of genes affecting pericarp color and polyphenols in the caryopsis of Sorghum bicolor (L.) Moench. Sorghum Newsletter 26: 103-104. 4 ref.

Inbred lines of genotypes were studied for gene-effect associations between known genes affecting sorghum pericarp color and testa presence or absence and their effect on relative polyphenols presence and concentration in the caryopsis determined by the Vanillin-HCl and the modified Vanillin-HCl assays. Grain which had both gene pairs present in their dominant form had higher polyphenols content than the grain which had at least one of the gene pairs present in a homozygous recessive form. Grain which contained the spreader gene in its dominant form had higher tannin content than the grain which contained the spreader gene in its recessive form.

0299 RAMAN, V.S. 1983. Inheritance of leaf-stripiness in grain sorghums. Sorghum Newsletter 26: 83.

Three sets of artificial cross-pollinations were effected employing the green-leaved plants of S. roxburghii, S. nervosum and S. splendidum as female parents and the striped S. roxburghii as male. Hybrids derived from these matings had green leaves only. In the F2, green and striped plants figured in the ratio of 15:1. When 2 striped plants of S. roxburghii were hybridized one with its green counterpart and another with a genotype of S. subglabrescens producing green leaves only, the progeny comprised green, albino, and striped plants, the frequency of the latter two being negligible. The mutability of plastids was the same irrespective of the ancestry

of F2 plants.

0300 RANA, B.S., and MURTY, B.R. 1983. Genotype-environment interactions for combining ability and breeding for wider adaptability in grain sorghum. Page 597 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Multilocational testing of a set of parents, F1s and F2s revealed, that both parents and hybrids showed genotype x environment (G x E) interaction but the predictability of hybrid x environment interactions was relatively high. Both general combining ability (gca) and specific combining ability (sca) showed G x E interactions. The stability of gca effects was predictable. The sca effects over locations were unstable. Since gca effects were positively correlated with their response to environments, selection of stable general combiners was found to be a prerequisite in breeding for wider adaptability.

0301 RANA, B.S., and RAO, A.S. 1983. Genetic consequences of mating systems in sorghum breeding. Page 597 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

The F1 and F2 generations of a set of single (SC), back (BC), three way (TWC) and double (DC) crosses were examined for grain yield. The performance per se of SC and BC was highest. Highest heritability was observed in TWC. The recombination pattern was also influenced by mating systems. High yielding plants among Tall (T) and (D) crosses was relatively higher in D x T SC, (D1 x T) x D1 BC or in (D1 x T) x D2 TWC. It is suggested that introgression of desirable genes in self pollinated crop should be made with minimum disruption of adaptive gene complexes.

0302 RANA, B.S., RAO, V.J.M., REDDY, B.B., and RAO, N.G.P. 1983. Overcoming present hybrid yield plateaus in sorghum. Page 6 In Precongress Scientific Meeting on Genetics and Improvement of Heterotic Systems. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

In crosses between temperate and tropical types, the temperate parents contributed the most yield heterosis. It is observed that the leaf N concentration, root activity and nitrate reduction activity are positively correlated with yield and can provide physiological basis for yield improvement.

0303 RANA, V.K.S., AHLUWALIA, M., and SINGH, D. 1983. Group analysis for forage cum grain sorghum. Page 598 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Biometrical studies for 21 quantitative component characters on diverse grain, forage, and forage-cum-grain elite lines revealed that all the 3 groups were exploitable for specified superior characters respectively in inter-breeding systems.

0304 RAO, K.E.P., and MENGESHA, M.H. 1983. Sorghum germplasm from Rwanda. Sorghum Newsletter 26: 86-87.

The landraces of sorghum

collected were relatively free from pests and diseases. Because of high altitudes and low temperatures prevailing in Rwanda, the tropical germplasm from this country may contribute source material for improvement of cold tolerance in sorghum.

0305 RAO, V.J.M., DEOSTHALE, Y.G., RANA, B.S., RAO, K.V., and RAO, N.G.P. 1983. Nutritional quality in grain sorghum--behaviour of crosses between high lysine sorghum and agronomically superior types. Indian Journal of Genetics and Plant Breeding 43(3): 383-394. 11 ref.

The genetic behaviour of protein, lysine and leucine was examined from F1 to F8 generations in crosses involving shrivelled high lysine Ethiopian sorghums and some agronomically desirable types. In F1, the plump opaque fraction was marginally superior to the plump translucent fraction for lysine; the shrivelled opaque was, the most superior. There was very low level of recombination between plump and shrivelled fractions of the same ear head in the segregating generations. The shrivelled types exhibited superiority over plumps with respect to both protein and lysine in F1 as well as in advanced generations. The lack of association between protein and lysine content in shrivelled seed indicates the possibilities of recovering high lysine with high protein. Selection in crosses resulted in the isolation of dwarf photo-insensitive agronomically desirable shrivelled types with high protein and high lysine. The frequency of occurrence of high lysine plants in F6-F8 generations indicated greater possibility of stabilising lysine between 2.5 to 2.8 percent in plump background.

0306 RAO, V.J.M., DEOSTHALE, Y.G., RAO, K.V., and RAO, N.G.P. 1983. Nutritional quality in grain sorghums: variability for protein, lysine and leucine. Indian Journal of Genetics and Plant Breeding 43(3): 380-382. 6 ref.

A study of variability for protein, lysine and leucine in representative germplasm collections, hybrids and cross derivatives revealed that the opaque types of fractions were marginally superior over translucent endosperm forms. The generally negative relationship between protein per cent and lysine per cent was confirmed in all plump endosperm types examined. None of them were comparable in lysine content to the shrivelled Ethiopian lines. The plump seeded types, dwarf white milo and saffra, seem to combine moderately high levels of protein and lysine with desired leucine: lysine ratio. Dwarf white milo is comparable or even slightly superior to 'P 721' and deserves further attention.

0307 RAO, V.J.M., REDDY, B.B., RANA, B.S., and RAO, N.G.P. 1983. Breeding for superior quality storage proteins in grain sorghum. Indian Journal of Genetics and Plant Breeding 43(3): 395-403. 6 ref.

A diallel set of crosses among high lysine and agronomically desirable plump and shrivelled parents was examined together with the corresponding F2 and back cross generations for protein and lysine content. The shrivelled x plump crossed seed become plump exhibiting xenia effect. The reciprocal differences were also significant. Non-additive gene action was predominant for protein as well as lysine. The shrivelled-seeded parents were better general combiners than the plump types. 'P 721' was found a better parent for transference of

protein and lysine together compared to the rest of the plump parents. 'P 721' as a female parent improves protein while as a male tends to increase lysine in crosses particularly with shrivelled parents. Compared to the F2, the back crosses generally tended to increase protein per cent with concurrent decrease in lysine. Some plump seeded segregants combining 10 to 16 per cent protein and 2.7 to 3.9 per cent estimated lysine values have been isolated.

0308 RAO, V.J.M., SANTHA, I.M., MEHTA, S.L., and RAO, N.G.P. 1983. Soluble protein patterns and esterase isoenzyme patterns in high lysine sorghums and their crosses. Indian Journal of Genetics and Plant Breeding 43(3): 328-341. 10 ref.

Soluble protein pattern from parents (N 49 and P-721) differed quantitatively and qualitatively from back crosses. However, the crosses had greater homology with P-721. The soluble protein pattern of crosses indicated greater recombination. Study of esterase isoenzyme pattern in parents and their crosses further confirmed the inheritance of major components with P-721, since the cross showed greater homology with P-721. Most of the crosses with high protein and high lysine had common features with respect to esterase isoenzymes. The distinct esterase isoenzyme pattern under high protein background would make it possible to use the pattern as markers in any future breeding programme.

0309 REDDI, T.V.V.S. 1983. Azide induced chlorophyll mutants in parents and hybrid of grain sorghum. Journal of Biological Research 3(1): 16-20. 11 ref.

The highest frequency of M1 panicles segregating for chlorophyll mutants was observed in the hybrid tests. Eighth and 16h presoaking and 0.004M concentration were found to be most effective. Varietal differences were evident with respect to the frequency and spectrum of chlorophyll mutants induced.

0310 REDDI, T.V.V.S., and PRABHAKAR, G. 1983. Azide induced chlorophyll mutants in grain sorghum varieties. Theoretical and Applied Genetics 64(2): 147-149. 10 ref.

Mutagenic action of sodium azide was investigated on two grain sorghum varieties BD 569 and IS 2339, 16 h presoaking and 0.001 molar concentration were found to be most effective in inducing chlorophyll mutation spectrum at pH 3. Maximum frequency of M1 segregating panicles and M2 chlorophyll deficient seedlings were observed in IS 2339. Varietal differences are evident in their response to the mutagenic action of the chemical.

0311 REDDI, T.V.V.S., and PRABHAKAR, G. 1983. Frequency and spectrum of chlorophyll mutants induced in grain sorghum by gamma rays. Sorghum Newsletter 26: 93-94.

The study showed that the percentage of X1 panicles and X2 seedlings for chlorophyll mutants tend to decrease with increase in dose of the mutagen and there were no mutants in 40 Kr dose. Chlorophyll mutants included albina, viridis, xantha and other categories like alboviridis, striata and zebra. Albinos were most frequent followed by xantha, viridis and other categories in 10 and 20 Kr dose but in 30 Kr all the mutants induced were of other categories.

0312 REDDI, T.V.V.S., and PRABHAKAR, G. 1983. Gamma ray

induced seedling injury and cytologically aberrant plants in grain sorghum variety BD 569. Sorghum Newsletter 26: 93.

It was observed that 20, 30 and 40 Kr gamma rays were the most effective in inducing seedling injury and cytological abnormalities in grain sorghum.

0313 REDDY, B.V.S., and HOUSE, L.R. 1983. Observations on associations of recovery drought resistance with some important agronomic traits in sorghum. Sorghum Newsletter 26: 128-129. 2 ref.

Correlations between recovery drought resistance with days to 50% flowering and with plant height were not consistant and considered to be small suggesting that it is possible to identify lines for recovery drought resistance in a range of height and maturity. Correlations between yield potential and drought resistance lacked consistency in direction from experiment to experiment and were low in magnitude indicating that it is possible to breed for recovery drought resistance in high yielding lines.

0314 REDDY, B.V.S., MAITI, R.K., SEETHARAMA, N., and PEACOCK, J.M. 1983. Genetic variability for moisture stress recovery resistance in sorghum. Sorghum Newsletter 26: 141-142. 1 ref.

Factors contributing to sorghum drought resistance were evaluated at ICRISAT, India by screening 364 advanced sorghum lines. The analyses of data indicated that sufficient time should be allowed following release from stress to maximize differences among genotypes for recovery and that selection for recovery would be more effective than selection for wilting and genetic gains from selection for this trait would be high.

0315 REDDY, B.V.S., SEETHARAMA, N., PEACOCK, J.M., and HOUSE, L.R. 1983. Genetic variability for recovery from moisture stress and its association with days to flowering and grain yield in sorghum. Page 603 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Recovery from moisture stress or recovery resistance (RR) is an important component of the genotypes performance under drought. The correlation of RR with days to flowering and grain yield potential was not significant in the absence of stress. Grain yield under drought was significantly correlated with RR. It is suggested that the progress in drought resistance can be made through selection for RR.

0316 REDDY, C.S., and SMITH, J.D. 1983. Induced mutations in sorghum. Andhra Agricultural Journal 30(4): 251-258. 24 ref.

Seeds of grain sorghum (TX 414) were treated with various doses of gamma rays, hydrazine (HZ) and ethyl methanesulphonate (EMS) singly and in combinations, with and without cysteine (CS) used as pre and post-treatment modifier. Hydrazine was found to be a more potent mutagen compared to EMS and gamma rays on the basis of induction of chlorophyll and morphological mutations in M2 generation. Cysteine by itself had no toxic effect in M1 nor induced any mutations in the M2, but when used as pre and post-treatments of gamma irradiated and hydrazine treated material it afforded protection against seedling injury

caused by gamma rays and HZ, and also increased the recovery of chlorophyll and morphological mutations compared to single treatments. Treatments of gamma rays, EMS and HZ in all possible combinations produced less than additive effects for the induction of mutations.

0317 REDDY, C.S., and SMITH, J.D. 1983. Varietal differences to gamma radiation in sorghum. I. Seedling growth analysis in M1 generation. Indian Journal of Botany 6(1): 83-89. 16 ref.

Two local cultivars of sorghum were irradiated with 20, 35 and 50 Kr dosage of gamma rays to study their differential response based on M1 characters. NM-31 was found to be more sensitive to gamma rays than TX-414 as evidenced by greater reduction in seed germination, length of primary root, coleoptile length and seedling height in M1 generation, with increasing dose of gamma rays. The rate of germination was also reduced and the emergence of primary leaf was delayed to greater extent in case of NM-31 compared to TX-414. The reduction in M1 characters was less at lower doses of gamma rays but increased sharply at higher doses. Significant differences between LD50 values for NM-31 (28.6 krads) and TX-414 (38.6) based on field emergence data indicated that TX-414 could be more radio resistant than NM-31. The differential response of the 2 varieties of sorghum to gamma radiation was attributed mainly to cytoplasmic difference between the varieties.

0318 REDDY, C.S., and SMITH, J.D. 1983. Viable mutations in grain sorghum induced by gamma rays, chemical mutagens and their combinations with cysteine. Genetica Agraria 37(1-2): 7-22. 32 ref. (Summary:It).

The spectrum of viable mutations after treatments with gamma rays, chemical mutagens (HZ, EMS and MMS) single and in combinations with and without cysteine used as pre- and post-treatment modifier was studied in sorghum variety, TX-414. A wide spectra of mutations affecting grain characteristics, plant height, panicle characters, leaf type, awned mutations of phylogenic importance and economic importance were isolated in the M2 generation. Hydrazine induced the highest frequency of viable mutations followed by MMS, EMS and gamma rays. A more than additive frequency of viable mutations was recovered in the combination treatments of gamma + HZ and gamma + MMS, while in HZ + EMS treatment a less than additive frequency was observed. Cysteine by itself induced no mutations, but a higher frequency and wider spectrum of viable mutations were recovered from cysteine pre- and post-treatments of HZ treated and gamma irradiated material.

0319 REDDY, V.N., BHALE, N.L., BORIKAR, S.T., and SHINDE, V.K. 1983. Parental stability for flowering under winter conditions in sorghum. Sorghum Newsletter 26: 17.

The significance of GXE (linear) indicated that the parental lines differed significantly in flowering for values of regression coefficient. The parents of CSH1 synchronized properly and the differences in the flowering were statistically nonsignificant. The results indicated that CSH1 hybrid seed can be produced by simultaneous planting of parents in the winter season. Instability of flowering in some parental lines created nicking problems in the seed production programs. It is suggested that the parents of

future hybrids should be fairly stable in flowering to avoid staggered planting.

0320 ROSENOW, D.T., QUISENBERRY, J.E., WENDT, C.W., and CLARK, L.E. 1983. Drought tolerant sorghum and cotton germplasm. Agricultural Water Management 7(1-3): 207-222. 36 ref.

Some of the breeding and screening techniques used to identify and select for drought tolerance in sorghum and cotton are discussed. Two distinct types of stress responses have been identified. One type is expressed when plants are stressed prior to flowering, while the other is expressed when stress occurs during grain fill. Excellent sources of tolerance to each type of stress have been identified, but high levels of both types of tolerance have not been found in the same genotype. Crosses among contrasting types of tolerance are being evaluated.

0321 ROSS, W.M, GORZ, H.J., HASKINS, F.A., HOOKSTRA, G.H., RUTTO, J.K., and RITTER, R. 1983. Combining ability effects for forage residue traits in grain sorghum hybrids. Crop Science 23(1): 97-101. 14 ref.

Traits studied in 100 F1 hybrids were height, flowering, tillering, seed weight, yield, protein percentage, protein yield of grain, leaves, and stems; and in vitro dry mater disappearance (IVDMD) percentage and digestible dry matter (DDM) yield of leaves and stems. General combining ability (GCA) effects exceeded specific combining ability (SCA) effects for all traits except height in females and grain and leaf yields in males. Both GCA and SCA were low for tillering and stem protein percentage. Genetic ratios, resembling heritability, were higher for GCA than SCA except for height in females and tillering in males. Grain yield, stem and leaf yields, and stem and leaf DDm yields all had moderate to strong positive relationships with each other. A few potentially useful parents were identified having high GCA effects for forage quality characters.

0322 ROSS, W.M., and HOOKSTRA, G.H. 1983. Performance of S1 progenies from a sorghum random-mating population sampled in different years. Crop Science 23(1): 89-90. 7 ref.

Samples of 200 S1's each taken from the same random-mating sorghum population in 3 different years were evaluated as S1 progenies for agronomic and grain protein traits for 2 years in a blocks-in-replications design to determine the effect of different seasons and different personnel on sampling. Means, family and family x year variances, heritabilities, predicted gains from selection, and genetic correlations were determined from the 3 samples. Significant differences were obtained among the 3 sample means for each of 7 traits, except tillering. Variability in height was attributed to drought that suppressed height during years of sampling but which was expressed during more favorable years of evaluation. Genetic correlations among the same pair of traits tended to be similar in the 3 samples. But there were four nonhomogeneous sets. Broad-sense heritabilities, calculated from plot means, and predicted gains from selection for each trait were similar in each of the 3 samples and indicated that S1's sampled any year from the same base population could be used for family recurrent selection.

0323 ROSS, W.M., and

NORDQUIST, P.T. 1983. Additional information on yield stability of sorghum random-mating populations. Sorghum Newsletter 26: 43-44.

The data on yield and stability of 7 random-mating populations and 3 F1 hybrids grown at 26 locations in USA in 1980 are presented. RP2B was the most stable population though the range of b-values was not great. RS626 and RS671 produced higher yields in the better environments.

0324 SAADAN, H.M., and MILLER, F.R. 1983. Inheritance of endosperm texture in the sorghum kernel. Sorghum Newsletter 26: 45-46. 5 ref.

Parental lines and F3 segregrating seed were used to determine the inheritance of kernel texture in sorghum. The heritability estimates for endosperm texture was very low revealing that endosperm texture is not simply inherited and its expression is strongly influenced by environment.

0325 SAEED, M., and FRANCIS, C.A. 1983. Yield stability in relation to maturity in grain sorghum. Crop Science 23(4): 683-687.

Yield stability in 54 sorghum genotypes in relation to maturity was studied in Nebraska and Kansas, USA across 48 environments. Significant genotype x environment interactions were detected for yield and seeds/sq m. Stability analysis of all genotypes ignoring maturity groups showed a significant linear and quadratic relationship between days to flowering and stability parameters, regression coefficient and deviations from regression, respectively, and suggested that differences in yield stability among genotypes were largely a function of relative maturity. Separate stability analysis of genotypes in a maturity group revealed no such relationship in the early and the medium groups. Yield stable genotypes were identified in each group but proportionately fewer in the late group. A combined analysis of genotypes without grouping failed to detect this stability of individual genotypes. It is suggested to consider seed weight and seed number when breeding for yield stability.

0326 SARADAMANI, N. 1983. Altered chiasma frequency in EMS treated population of grain sorghum. Sorghum Newsletter 26: 91-92. 4 ref.

The variety IS 7155 and the hybrid IS 7155 x BD 569 were used in the study with EMS concentrations of 0.1, 0.2, and 0.3%. The average chiasmata per cell in the parent was 16.86 + or - 1.88, while in the hybrid it was 17.97 + or - 1.21. The parent and the hybrid showed significant reduction upon treatment. The variability in the treated plants was markedly higher than in the controls. Meiotic studies revealed a high frequency of rod bivalents and laggards at anaphase I.

0327 SARADAMANI, N. 1983. Induced variants in grain sorghum. Sorghum Newsletter 26: 92-93. 1 ref.

When 2 varieties of sorghum and 2 hybrids were irradiated with gamma rays, some chlorophyll and morphological variants were observed in X1 generation. The treated plants showed a marked reduction in chiasma frequency at diatineses and metaphase I due to the reduction in ring bivalent formation and a corresponding increase in the rod type.

0328 SARWAR, H.A.K. 1983. Asessment of advanced sorghum varieties and hybrids for drought resistance. Sorghum Newsletter 26: 9-10.

Out of 13 varieties assessed, 6 were not affected by the severe drought, and of these Y-75, a local variety, was found to be doing well with lush green leaves from top to bottom. SPV-126, SPV-386, SPV-459, SPV-462, and SPV-463, were resistant and SPV-475 was moderately tolerant, and CSV-4 was highly affected. Out of 14 hybrids assessed, CSH-9 was resistant, SPH-42 was tolerant, and SPH-176 was moderately tolerant. Of the remaining 11 entries, 10 were moderately susceptible, and the entry SPH-159 was highly susceptible to drought.

0329 SCHERTZ, K.F. 1983. Potentials with new cytoplasmic male sterility systems in sorghum. Report of Annual Corn and Sorghum Research Conference 38: 1-10. 17 ref.

The characteristics of the sterility inducing cytoplasms, the opportunities they provide and the potentials to identify other useful cytoplasms are discussed. Milo cytoplasm A2 is identified as the best choice. A3 and 9E are recommended for strong sterility, and KS35, KS36, and KS37 for slight cytoplasmic diversity.

0330 SECHNYAK, L.K., DREMLYUK, G.K., and GAMANDII, V.L. 1983. Evaluation of male-sterile lines of sorghum for cold resistance by means of germinating grain in artificial climate chambers. (Ru). Nauchno-Tekhnicheskii Byulleten' Vsesoyuznogo Selektsionno-Geneticheskogo Instituta 1: 39-43. 6 ref.

Twentyfive male sterile lines were evaluated by germination at 8 deg/-6 deg C day/night temperatures. Lines with high and moderate cold resistance are listed. Lines of the Midland K2506 type were highly resistant.

0331 SELVARAJ, S., and RAMASWAMY, K.R. 1983. Parental influence on seed storability in sorghum hybrids. Page 28 In Precongress Scientific Meeting on Genetics and Improvement of Heterotic Systems. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

Grain from crosses between the male sterile lines and of the male parents showed highest germination and good storability. Grain characters and vigour were influenced by the female parent.

0332 SEMENOVA, T.V. 1983. Variability and heritability of the duration of interphase periods of vegetation in sorghum. (Ru). Biulleten, Vsesoiuznyi Institut Rastenievodstva 134: 44-45.

0333 SESHAVATHRAM, V., RAMALINGASWAMY, M., and MURTY, U.R. 1983. Microsporogenesis in temperate and tropical cytoplasmic genic male steriles in Sorghum bicolor (L.) Moench. Cereal Research Communications 11(3-4): 287-289. 7 ref.

The objective of the present study was to find out whether any basic differences exist between these two groups of cytoplasm concomitant with the predominantly B type or R type of interaction which they give rise to.

0334 SHEN, J.H., and ZHOU, G.Y. 1983. Reassociation kinetic analysis of repeated DNA sequences in rice, sorghum and a rice-sorghum hybrid. (Ch). Acta Genetica Sinica 10(1): 28-35. 29 ref. (Summary:En).

The reassociation kinetic analyses of the repeated sequence DNA of rice, sorghum and one of their stable hybrids had been performed. Employing computer technique, the general view of these three plants genome organization was outlined. It was found that by comparison with its mother plant rice, an apparent change had happened in the middle repeated sequence component of the stable hybrid.

0335 SHINDE, V.K., AMBEKAR, S.S., NANDANWANKAR, K.G., and CHUNDURWAR, R.D. 1983. Evaluation of shootfly resistant lines for their combining ability. Sorghum Newsletter 26: 26-27.

Results indicated that among male parents Sel. 28 is a good general combiner, and Sel. 30 and Sel. 12 were poor combiners. MS-2219A was a good combiner line among females. Hybrids, 2077A x Sel. 28 exhibited the highest specific combining ability effects followed by 2077 A x Sel. 12. For mean grain yield 2077 A x Sel. 28 recorded maximum grain yield followed by 2219 A x Sel. 27.

0336 SHINDE, V.K., NANDANWANKAR, K.G., and AMBEKAR, S.S. 1983. Heterosis and combining ability for grain yield in rabi sorghum. Sorghum Newsletter 26: 19.

Results indicated that crosses between local x local parents exhibited maximum heterosis of 40.95% as compared to 12.96% between improved x improved varieties which might be due to greater genetic diversity present in the local strains. For all hybrids together, average heterosis was maximum for grain yield and 1000-grain weight while heterosis for panicle length negative. Moderate heterosis was observed for plant height.

0337 SHMARAEV, G.E., and SEMENOVA, T.V. 1983. Variability and heritability of quantitative characters in sorghum. (Ru). Biulleten, Vsesoiuznyi Institut Rastenievodstva 133: 41-44. 6 ref.

0338 SILVA, J.B.C. DA. 1983. Selection of genotypes of sorghum (Sorghum bicolor (L.) Moench) and soybean (Glycine max (L.) Merril) tolerant to aluminium toxicity. (Pt). M.Sc. thesis, Universidade Federal de Vicosa, Vicosa, MG, Brazil. 55 pp. 62 ref.

0339 SINGH, A.R., and BORIKAR, S.T. 1983. Performance of resulting crop as influenced by dates of harvesting in sorghum. Sorghum Newsletter 26: 23.

Genotype x dates of harvesting interaction indicated that all the genotypes harvested betwen 25-35 days after flowering were desirable for effective plant population, plant height, test weight, and grain yield/ha while grain weight/earhead due to this interaction was not consistent.

0340 SISODIA, N.S., HENRY, A., and GUPTA, Y.K. 1983. Genetic divergence in grain sorghum. Madras Agricultural Journal 70(10): 678-680. 5 ref.

Genetic divergence was assessed in 30 varieties of sorghum using generalised distance for eight characters related to yield. The population was grouped into 8 clusters. Clusters II, I and III were large and consisting more than two third of the total population. Days to maturity, plant height, ear girth and ear length were mainly responsible for genetic divergence. Clusters with small statistical distances were considered less diverse than those with large distances. Only genetically diverse lines with

specific characters of interent and having high yield potential should be intercrossed. The varieties belonging to V and VII, respectively, were found genetically diverse and also of high yield potential and as such could be crossed with varieties belonging to II for evolving high yielding and early maturing varieties.

0341 SONI, H.S., and BORIKAR, S.T. 1983. Inheritance of albina mutant in sorghum. Sorghum Newsletter 26: 91.

Results revealed 3 normal : 1 albina ratio in all the M3 families and totals based on 2 varieties indicating the role of monogenic recessive gene in controlling albina character in sorghum.

0342 SUKASAME CHITSING. 1983. Selection efficiency of three breeding methods (pedigree method, bulk method and single seed descent method) for grain yield of two sorghum crosses (Sorghum bicolor (L.) Moench) at two population densities. (Thai). M.S. thesis, Kasetsart University, Bangkok, Thailand. 97 pp. 56 ref. (Summary:En).

0343 TARUMOTO, I. 1983. Multiple alleles on glossy locus in Sorghum bicolor (L.) Moench. Page 643 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

In this report, inheritance mode was studied in F2 populations of crosses among non-glossy (Gl), glossy (gl), and true glossy (tgl) genotypes. The segregations of Gl and gl, Gl and tgl, and gl and tgl were in the ratio of 3:1 in the corresponding F2 populations, respectively. These results suggest that the genes controlling the phenotypes of Gl, gl and tgl plants are the multiple alleles on the same locus.

0344 TRIPATHI, D.P., MEHTA, S.L., and RAO, N.G.P. 1983. Soluble proteins and isoenzymes from seeds of diverse male steriles of sorghum, (Sorghum bicolor (L.) Moench). Theoretical and Applied Genetics 64(4): 325-331. 7 ref.

Soluble protein patterns from sterile and maintainer lines differed both qualitatively and quantitatively. Based on the esterase patterns, male steriles with different cytoplasms could be separated into 3 groups. Each group could further be differentiated on the basis of minor differences in esterase isoenzyme patterns within each group. ADH and GDH patterns in general were similar in both sterile and maintainer lines.

0345 VADHER, P.V., DESAI, K.B., and RAWAL, P.P. 1983. Studies on the effect of gamma rays on germination and seedling growth of three improved varieties of sorghum. Sorghum Newsletter 26: 87.

The reduction in germination percentage, root and shootlength of the seedling was proportionate to the dose administered. Among different doses, the maximum reduction in root length was observed where gamma rays were administered at 40 Kr level in all the 3 varieties under study.

0346 VADHER, P.V., DESAI, K.B., KUKADIA, M.U., and BADAYA, S.N. 1983. Mutagenesis by gamma-rays in grain sorghum. Indian Journal of Agricultural Sciences 53(8). 755-759. 15 ref.

Seeds irradiated with gamma-rays were sown along with the control. The data on M1 and M2 panicle

characters, sterility, grain yield and weight are averaged and statistically analysed.

0347 VALDES GUTIERREZ, J.A. 1983. Breeding and evaluation of Sorghum bicolor (L.) Moench hybrids for adaptation using base metabolic temperature (BMT) as a selection tool. Ph.D. thesis, Texas A & M University, College Station, Texas, USA. 155 pp.

The data on performance and adaptation of 88 F1 sorghum hybrids grown in Texas, USA and Tampico, Mexico are evaluated. Plant height, plant desirability rating, panicle length and panicle weight correlated with BMT. The regression of BMT vs. grain yield showed a negative association indicating low BMT genotypes produced highest yields. This association could be used in early testing to predict high yielding combinations BMT of male parents was positively transmitted to F1 hybrids.

0348 VERMA, P.K., and SINGH, R. 1983. Genetic analysis of heterosis in sorghum. Indian Journal of Agricultural Sciences 53(9): 771-775. 8 ref.

The nature and magnitude of gene effects for several quantitative and qualitative characters were estimated in 2 commercial hybrids of grain sorghum. Dominance and dominance x dominance type of non-allelic interactions were found to play a significant role in the expression of heterotic manifestations. The magnitude and to some extent even the nature of gene effects governing heterosis for various characters were found to differ when estimated over the 2 years. Gene effects should hence be studied in different environments (over years and locations) so that the influence of the environment is precisely estimated before chalking out breeding strategies.

0349 VERMA, P.K., SINGH, R., and RATHORE, V.S. 1983. Physiological and biochemical analysis of heterosis in sorghum. Indian Journal of Agricultural Sciences 53(7): 504-510. 16 ref.

The length and dry matter of the root and shoot, the relative rate of photosynthesis and the activity of ribulose 1,5-diphosphate (RuDP) and phosphoenol pyruvate (PEP) carboxylases were studied in the seedlings of 2 hybrids of sorghum. Heterosis for these attributes which was fairly high during the initial stages, declined with time, resulting in almost no advantage. The growth behaviour and photosynthesis, when split up at the components level, appeared to show Mendelian dominance in the F1 hybrids. The complementation of all these processes in F1 and the interaction among them eventually appeared to make the F1s outstandingly superior to their parents.

0350 VERMA, P.K., SINGH, R., and SINGH, I.S. 1983. Heterosis, inbreeding depression, heritability and genetic variability in sorghum. Page 647 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Heterosis was observed for most of the characters studied in 2 hybrids during 1978-79. A negative heterosis was observed for days tO 50% flowering. Heritability and genetic advance for grain yield and its components were found high. Genetic variance was observed in all the characters studied.

0351 WEBSTER, O.J. 1983. Inheritance studies: leaf spot

(sp9), high lysine, normal vs bloomless and tenuous. Sorghum Newsletter 26: 95.

The studies showed that the inheritance of leaf spot (sp9) was controlled by a single recessive gene, and is inherited independently of awnless vs. awns (Aa) or normal vs. liguleless (Lglg). The viability of high lysine seed was poor. The F2 segregrated for Aa but there was no linkage between the genes for defective endosperm and awns. The test crosses showed that bloomless gene was inherited independently of the genes for seed colour, zebra stripe, short leaf or chiltex leaf spot. The F1 seed obtained from 4 heterozygous lines segregated for tenuous demonstrated that all 4 genes for tenuous are allels.

0352 WOREDE, M. 1983. Crop genetic resources in Ethiopia. Pages 143-147 In More food from better technology (Holmes, J.C., and Tahir, W.M., eds.). Rome, Italy: FAO. 11 ref.

Sorghum lines with genetic traits such as earliness, drought tolerance and disease and pest resistance were identified from 5200 accessions maintained in Ethiopia.

0353 WORSTELL, J.V., KIDD, H.J., and SCHERTZ, K.F. 1983. Characteristics of four cytoplasm types of sorghum. Agronomy Abstracts. pp. 85-86.

8 Milo A1 and A2 cytoplasm types differed only in degree of fertility restoration. Hybrids with A3 cytoplasm gave fertility reactions opposite to those with A1. A4 cytoplasm was similar to A3 on 5 of 8 testers, but unlike all cytoplasms on the other 3 testers. Sterile plants with A3 had 1-3% filled pollen grains, while those with A4 had 71%. Pollen exines were rare in sterile plants with A1 and A2. All 4 cytoplasm types induced male sterility in combination with a BTx398 nucleus.

0354 WRIGHT, G.C., SMITH, R.C.G., and MCWILLIAM, J.R. 1983. Differences between two grain sorghum genotypes in adaptation to drought stress. I. Crop growth and yield responses. Australian Journal of Agricultural Research 34(6): 615-626.

A sorghum F1-hybrid, E-57, with reputed drought resistance was compared with another F1-hybrid, TX-671, under irrigation and dryland conditions of severe rainfall insufficiency but ample soil water at depth in a deep cracking clay soil. Significant cultivar differences in grain yield occurred under rain-fed but not under irrigated conditions. Differences in yield were associated with different morphological responses to drought stress, with the variety E-57, in comparison with TX-671, having a lower level of floret abortion, the ability to maintain green leaf area longer during grain-filling and probably a higher root to shoot ratio. The implication of these results in relation to adaptation to drought stress is discussed.

0355 YAO-WU, L. 1983. Autotetraploid sorghum. Sorghum Newsleter 26: 82.

The characteristics of induced autotetraploid sorghum are studied. The primary advantages of autotetraploid sorghum over the diploid types are the large seed size and high protein content. But the fertility or seed set is low. The panicle was partially wrapped by flag leaf and could not emerge well. The chromosome count in root tips of induced autotetraploid, showed that majority of the seedlings had 40

chromosomes. In meiosis, the pollen mother cells of autotetraploids showed both multivalents and univalents in diplotene, different nos. of quadrivalents and bivalents in metaphase I, and 90% of cells had 20-20 distribution in anaphase I.

0356 YU, Z.P. 1983. Breeding and selection of the hybrid sorghum Jinza 5 with long rhizomes. (Ch). Shanxi Agricultural Science 2: 23-24.

Jinza 5 was well adapted to dry conditions. It was also cold-tolerant and resistant to Colletotrichum graminicola.

0357 ZAMBRANO RUIZ, R. 1983. Heterosis in 19 experimental hybrids of grain sorghum, sorghum bicolor. (Es). Revista de Investigaciones Agropecuarias 9-10(1-2): 51-66. 32 ref. (Summary:En).

0358 ZAMBRANO RUIZ, R. 1983. Yield potential, morphological characteristics and phenotypical correlations in 9 genotypes of grain sorghum, Sorghum bicolor (L.) Moench). (Es). Revista de Investigaciones Agropecuarias 9-10(1-2): 15-25. 9 ref. (Summary:En).

0359 ZHANG, X.S. 1983. Reasons for the degeneration of hybrid sorghum and methods of improvement. Shanxi Agricultural Science 10: 33-35.

The system of producing pure lines of only one of the parents for hybrid seed production led to yield reductions in Shanxi, China. The simultaneous production of pure lines of each of the 3 parental lines using 3 separate nurseries is recommended.

0360 ZHAO, T.Y., SHI, P., and GUO, J.A. 1983. Relationship between heterosis of photosynthetic characters and yield components in sorghum. (Ch). Shanxi Agricultural Science 9: 18-21.

A study of hybrids and parents revealed that leaf area showed highest heterosis, followed by photosynthetic rate and economic coefficient. Photosynthetic period showed negative heterosis. 1000 grain weight, grain number/ear were correlated with leaf area and photosynthetic rate. Photosynthetic characters increased the yield of sorghum hybrids.

0361 ZUOCHANG, L., JIGENG, L., HUIXIN, L., and FUTAI, C. 1983. Studies on the ribulose bisphosphate carboxylase and cytoplasmic male-sterility. (Ch). Acta Genetica Sinica 10(1): 43-50. 12 ref. (Summary:En).

Activity of RuBPCase was determined with NaH 14CO2 by the liquid scintillation spectrometer method. Results obtained indicated that activity of RuBPCase in male-sterile lines of tested crops including sorghum was higher than that of their maintainers respectively, indicating the relationship between RuBPCase and the cytoplasmic male-sterility.

Hybrids, Varieties, and Performance Trials

0362 ANONYMOUS. 1983. Sorghum varieties. (Fr). Cultivar 158: 56-57.

0363 ATKINS, R.E. 1983. Registration of 12 sorghum parental lines. Crop Science 23(6): 1229. 1 ref.

Parentage and pertinent agronomic characteristics of inbred

lines of sorghum released as germplasm by the Iowa Agriculture and Home Economics Experiment Station, USA are presented.

0364 ATKINS, R.E. 1983. Sorghum hybrid performance of greenbug resistant lines. Sorghum Newsletter 26: 43.

Information on hybrids produced by crossing 37 greenbug-resistant R lines onto 3 greenbug-susceptible male-sterile seed parents is given. Significant differences among the sources of resistance were found for grain yield, days to midbloom, seeds per head, heads per plant, and plant height. Marked variability for grain yield and many other characters was shown by hybrids with the KS30-line resistance. The PI 264453 source produced hybrids that were near the average in performance for all characters measured.

0365 AUSTRALIA:QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES. 1983. Plant industry highlights. Queensland Agricultural Journal 109(6): 22-23.

Sorghum is one of the new cultivars of crops described.

0366 BONNEMANN, J.J. 1983. 1982 grain sorghum performance trials. Circular, South Dakota Agricultural Experiment Station no. 240. 14 pp.

The trials were conducted by the South Dakota Agricultural Experiment Station, USA. Date on yields and other agronomic data like height, moisture percent and test weight of entries at different test sites are tabulated.

0367 CAMPOS, R.M. DE, SALGADO, J.S., and SANTOS, J.A.C. 1983. Grain sorghum (Sorghum bicolor (L.) Moench) in the north of Espirito Santo. (Pt). Comunicado Tecnico, Empresa Capixaba de Pesquisa Agropecuaria no. 16. 4 pp.

Yield data of 28 sorghum cvs. are given. Max. grain yields ranged from 4.3 - 5.0 t and the min. from 1.8 - 2.0 t/ha. Regrowth after harvest was an additional food source for cattle.

0368 CHANTEREAU, J. 1983. Selection of sorghum hybrids for the north central and northern regions of Senegal. (Fr). Agronomie Tropicale 38(4): 295-302. 8 ref.

The hybrids from North America were suited to obtain F1 formulae adapted to irrigated farming, but not rainfed crops for which the best hybrids were developed from partially African male sterile lines bred on the spot. These showed drought resistance qualities superior to the fixed material.

0369 CORDONNIER, M.J., DAY, J.L., FISHER, C.D., and PETTIGREW, W.T. 1983. 1982 field crops performance tests: peanuts, soybeans, sorghum, cotton, tobacco, sunflowers, and summer annual forages. Research Report, Georgia Agricultural Experiment Stations 422: 1-2, 44-62, 72-73.

Results of the performance tests on sorghum hybrids at different experiment stations of Georgia are presented in 18 tables.

0370 DAKHORE, R.C. 1983. Root CEC as a criterion for screening varieties of sorghum for their yield potential. Journal of Research, Punjab Agricultural University 7(2): 20-22. 8 ref.

Nine varieties of sorghum were tested for their root CEC, yield potential and uptake of nutrients. There were considerable differences in root form and cation exchange

capacity of roots of different varieties of sorghum. Root CEC values ranged from 11.3 to 14.2 me/100 g dry roots. There was a positive significant correlation (r=0.96) between root CEC and grain yield. Root CEC also governed the uptake of nutrients. Therefore, it was concluded that the root CEC may be used as an index for judging the yield potential of sorghum varieties.

0371 DENMAN, C.E., MCNEW, R.W., MERRITT, R.G., REEVES, H.E., ALEXANDER, J.P., PECK, R.A., BELETE, K., and WENGER, R.F. 1983. Performance trials for hybrid sorghum and corn in Oklahoma, 1982. Research Report, Oklahoma Agricultural Experiment Station no. P-835. 38 pp.

Performance trials for grain, forage, and sudangrass hybrid sorghums were conducted in 8 locations. The data are presented in 15 tables. Agronomic information in the tables are obtained by actual counts and measurements. Damage estimates from pests are based on visual observation.

0372 DESAI, K.B., PATEL, R.H., DESAI, R.T., DESAI, D.T., and PANDYA, R.K. 1983. Linear regression of hybrids on parental lines in sorghum. Sorghum Newsletter 26: 11. 3 ref.

Evaluates performance of lines per se in relationship to performance of parental hybrids. Results indicate that preliminary evaluation of lines per se would provide an effective test of potential parents and subsequent test cross evaluation of high x high line could result in better yielding hybrids.

0373 DREIER, A.F., NORDQUIST, P.T., ELMORE, R.W., NELSON, L.A., and GRABOUSKI, P.H. 1983. Nebraska grain sorghum performance tests, 1982. Extention Circular, University of Nebraska, Cooperative Extension Service. no. 83-106. 28 pp.

The trials were conducted by the Nebraska Agricultural Experiment Station, USA to obtain yield and other data for some of the hybrids and varieties developed earlier. Results are presented in the data tables.

0374 DREMLYUK, G.K., and MALYUZHENETS, N.S. 1983. Interrelation of economically useful characters in grain sorghum under conditions of genotypic variation. (Ru). Nauchno-Tekhnicheskii Byulleten' Vsesoyuznogo Selektsionno-Geneticheskogo Instituta 2: 13-16. 5 ref.

Twenty varieties were evaluated for yield components. The grain number contributed significantly. The effect of grain weight and no. of fertile tillers on yield was also quite marked.

0375 DUNAVIN, L.S., and PEACOCK, H.A. 1983. Variety trials of summer annual grasses, sorghum and other crops for silage, alfalfa and clover, and grain sorghum. Research Report, Agricultural Research Center, Jay, Florida no. WF 83-2. 16 pp.

Sixty sorghum cultivars were tested in 1982 on a Red Bay sandy soil (Rhodic Paleudult) to determine yield lodging, height, heading date and disease resistance at Florida, USA. Various sorghum types were also entered in the silage trial. The data are presented in tables.

0376 DUNCAN, R.R. 1983. Concentration of critical nutrients in tolerant and susceptible sorghum lines for use in screening under acid soil field conditions. Pages

101-104 In Genetic aspects of plant nutrition (Saric, M.R., and Loughman, B.C., eds.). The Hague, Netherlands: Martinus Nijhoff. 5 ref.

This paper reports relative leaf element concentration values from 21 sorghum genotypes grown under 5 acid soil field environments in the southeastern USA. The leaf element uptake values are subsequently used to derive an acid soil field tolerance rating in conjunction with dry matter production values and visual rating scores to categorize sorghum genotypes for tolerance or susceptibility.

0377 FINKNER, R.E. 1983. Test yields of sorghum and corn, 1982. Research Report, New Mexico Agricultural Experiment Station no. 504.

0378 GOURLEY, L.M., ROGERS, S.A., EDWARDS, N.C., SANDERS, T.G., ARNOLD, B.L., BUEHRING, N.W., and HARMAN, R.D. 1983. Mississippi grain sorghum performance trials 1982. Bulletin, Mississippi Agricultural and Forestry Experiment Station no. 916. 7 pp. [Also published in MAFES Research Highlights 46(1): 5-8. 1983].

The performance of 62 commercial and experimental hybrids tested are presented with the help of tables.

0379 GUSS, A., DESSAUNE FILHO, N., SALGADO, J.S., and MORAES, M.B. DE. 1983. Evaluation of fodder yield from Sorghum vulgare cultivars and of trimming height on the production of new shoots. (Pt). Boletim de Pesquisa, Empresa Capixaba de Pesquisa Agropecuaria no. 3. 18 pp. 7 ref. (Summary:En).

0380 HALE, O.M., and MOSS, R.B. 1983. Characteristics of 5 grain sorghum hybrids. Research Report, Georgia Agricultural Experiment Stations 435: 1-5.

0381 HERNANDEZ MARTINEZ, M., and BETANCOURT VALLEJO, A. 1983. Performance of the lines from the ADIN (All Disease and Insect Nursery) at the Bajio, Mexico. Sorghum Newsletter 26: 119-120.

The data on yield, and plant height of the 18 best lines of the 70 entries evaluated at a trial are presented.

0382 IAKUSHEVKSII, E.S., and VAKHNENKO, V.V. 1983. Grain sorghum specimens and hybrids promising in West Kazakhstan. (Ru). Biulleten, Vsesoiuznyi Institut Rastenievodstva 133: 20-25. 6 ref.

0383 IAKUSHEVSKII, E.S., and VINOGRADOV, Z.S. 1983. Prospects for introducing sorghum in Kazakhstan [varieties]. (Ru). Biulleten, Vsesoiuznyi Institut Rastenievodstva 133: 7-13. 11 ref.

0384 KEBEDE, Y. 1983. Comparative performance and basis for differences among sorghum (Sorghum bicolor L. Moench) hybrids from different periods of sorghum. Ph.D. thesis, Texas A & M University, College Station, Texas, USA. 128 pp.

Morphological, physiological, genetic and adaptational differences between old and new sorghum hybrids were evaluated at Texas, USA. The results indicated yield advantage for new hybrids which performed relatively better in dryland environments compared to old hybrids. New hybrids had higher crop growth rates and higher heterosis for all characters studied.

0385 KOLDING, M.F. 1983. A summary of grain sorghum (Sorghum bicolor (L.) Moench) screening trials in eastern Oregon. Special Report, Oregon Agricultural

Experiment Station 684: 11-16. 2 ref.

Data on yield, bushel weight, heading day, days to heading, plant height, kernel maturity, tillering type, sterility and grain moisture of sorghum varieties studied in yield trials at Oregon, USA in 1972 and 1975 are presented.

0386 LIMA, P.R. DE A., and ARAUJO, A.G. DE. 1983. Comparison of graniferous sorghum cultivars in the state of Piaui [Brazil]. (Pt). Pesquisa em Andamento, Unidade de Execucao de Pesquisa de Ambito Estadual de Teresina (Brazil) no. 26. 3 pp.

0387 LODHI, G.P., and BANGARWA, K.S. 1983. Performance of some dual purpose sorghum lines. Sorghum Newsletter 26: 8-9.

Six strains out of 30 tested were found superior to checks in both fodder and seed yield, early maturing and disease resistant. S260 gave better fodder productivity and topped in seed production.

0388 LOMTE, M.H., and DABHADE, R.S. 1983. Comparative performance of some promising varieties of grain sorghum with hybrid CSH-5. Sorghum Newsletter 26: 20-21.

The study revealed that the variety SPV-346 was comparable to CSH-5 with respect to grain yield and better in fodder yield and quality.

0389 MALI:INSTITUT DU SAHEL, DEPARTEMENT DE LA RECHERCHE. 1983. Regional Millet, Sorghum, Cowpea, and Maize Improvement Project - regional sorghum trials 1982. (Fr). Bamako, Mali: Institut du Sahel. 44 pp.

Results of the performance trials of sorghum at Gambia, Burkina Faso, Mali, Mauritania, Niger and Senegal are presented.

0390 MONK, R.L., MILLER, K.R., and CREELMAN, R.A. 1983. Sorghum characteristics for energy conversion. Sorghum Newsletter 26: 44-45.

Performance of sweet sorghums, grain sorghums, and hybrids between these types were evaluated for 3 years in a high energy test. The hybrids consistently outyielded the sweet or grain types when compared on a total biomass basis. Of the sweet types, Brandes and Wray both produced high biomass yields, and performed well in hybrid combination with AT x 623. The grain types could not compete effectively on a total production basis.

0391 MORON, H.E. 1983. Uniform test of grain sorghum yield. (Es). Thesis, Universidad de Panama, Panama. 59 pp. 21 ref.

0392 MURTY, D.S., DE FRANCA, J.G.E., NICODEMUS, K.D., and HOUSE, L.R. 1983. Hybrid performance of some recently developed male sterile lines [sorghum]. Presented at the All India Coordinated Sorghum Improvement Project Workshop, 18-22 April 1983, Haryana Agricultural University, Hisar, India. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0393 MURTY, U.R., and KIRTI, P.B. 1983. The concept of vybrids. I. Comparative performance of pure line, hybrid and vybrid varieties in sorghum. Cereal Research Communications 11(3-4): 229-235. 3 ref.

Yield and yield attributes were compared in pure line, hybrid and vybrid varieties in sorghum. The differences within a particular

category were not significant for most of the characters, but between category differences were highly significant for all characters except harvest index. Except for 100 grain weight, the vybrids occupied an intermediate position between pure lines and hybrids for all the characters. The vybrids had superior 100 grain weights. It was concluded that the concept of vybrids represents a viable proposition of breeding near optimum genotypes in sorghum for stress environments.

0394 MURTY, U.R., RAO, N.G.P., KIRTI, P.B., and BHARATHI, M. 1983. Purelines, hybrids and vybrids in sorghum. Page 574 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

A comparison was made of the performance of released pure line and hybrid varieties with experimental vybrids in several tests at Hyderabad, India during the rainy and the postrainy seasons. Vybrids outyielded pure line varieties and on par with commercial hybrids.

0395 NIMBALKAR, V.S., BHARUD, R.W., and JADHAV, P.B. 1983. Evolution of advanced winter sorghum entries under drought prone condition. Sorghum Newsleter 26: 30.

A set of 24 sorghum entries, another set of 26 entries, and a third set of 14 hybrids along with M35-1, SPV-86, and CSH-8R checks were tested separately for evaluation of their performance under low rainfall condition at the Dry Farming Research Project, Solapur, India. The entry SPV-430 gave the highest grain yield, and the entry SPV-510 gave highest stover yield in the first set. In the second set, the entry MRV-511 was found to be most promising for both grain and fodder yield. In set 3, hybrids SPH-204 and SPH-278 gave highest grain and fodder yield, respectively.

0396 OKOH, P.N., and OBILANA, A.T. 1983. Preliminary report on the properties of Nigerian sorghum varieties and their potential for brewing. NOMA 4(1): 20-21. 3 ref.

The physical properties, tannin content of sorghum and its potential for utilization in the brewing industry in Nigeria are discussed.

0397 OROZCO MEZA, F. DE J., and MENDOZA ONOFRE, L.E. 1983. Comparison of sorghum hybrids (Sorghum bicolor (L.) Moench) and some of their progenitors. (Es). Agrociencia 53: 87-98. 26 ref. (Summary:En).

Sixty-four hybrids and inbred lines were tested for agronomic characters and yield components. Correlations with yield were high in ear weight, no. of grains per ear and harvest index. Positive correlations were noticed between the performance of lines and their general combining ability. Heterosis was not at its highest in highest-yielding hybrids. Some of the experimental hybrids were better than the commercial hybrids in quality and yield.

0398 RAJKI-SIKLOSI, E. 1983. "GKI Remeny" and "GKI Napsugar" new Hungarian grain sorghum hybrids. Sorghum Newsletter 26: 5.

The grain yield of 5 sorghum hybrids produced in Hungary was studied for 6 years. NK 101 had the highest standard deviation and Hybar 242 and GKI Remeny had the lowest.

0399 SAAD-ALLA, M.M.M. 1983. Studies on variability in grain sorghum. M.Sc. thesis, Assiut University, Assiut, Egypt. 109 pp. (Summary:Ar).

Grain yield and yield components of 90 local collections, 7 Giza varieties and 3 exotic varieties of sorghum were studied in Egypt.

0400 SANGDUEN, N., and HANNA, W.W. 1983. Chromosome and seed set studies on grain sorghum x johnson grass interspecific hybrids and their reciprocals. Agronomy Abstracts. p. 79.

Hybrids between tetraploid Sorghum bicolor and S. halepense were examined at diakinesis and metaphase I. Chromosomes paired mainly as bivalents and quadrivalents, but univalents and octovalents were also found. Most backcross progeny using pollen from diploid S. bicolor and progeny from the reciprocal cross had 40 chromosomes. Certain tetraploid interspecific hybrids, when used to pollinate a cytoplasmically male-sterile diploid gave progenies with 20 and 40 chromosomes. Grain set was affected by nucleocytoplasmic interactions in some hybrids.

0401 SILVERO SANZ, O.I., and CONDE, A.A. 1983. Evaluation of commercial grain sorghum cultivars. Sorghum Newsletter 26: 1.

Fourteen short, 19 medium, and 18 long-cycle cultivars were sown at the Parana Agricultural Experimental Station in Argentina to determine variances in the yield of the cultivars. Analysis of variance showed significant difference at the 1% level in the 3 cycles. The C.V.'s were 12.5%, 17.2%, and 12.6% for short, medium and long cycles respectively.

0402 SILVERO SANZ, O.I., and CONDE, A.A. 1983. Primary evaluation of experimental hybrids. Sorghum Newsletter 26: 1.

Reports experiments at the Parana Agricultural Experimental Station in Argentina involving 156 new sorghum hybrids and 13 commercial controls. Analysis of variance showed significant differences at the 1% level, with a C.V. of 25%. DA 48 was judged as the best commercial hybrid, being exceeded by 12 new hybrids. Agronomic characters such as head size, leaf number and plant height showed great variation.

0403 TAMIMI, S.A., HADDADIN, M.A., and HALASEH, H.M. 1983. Varietal test of sorghum under rainfed conditions in Central Jordan. (Ar, En). Amman, Jordan: Ministry of Agriculture. 9 pp. 9 ref.

0404 TOMITA, M., TAKAHASHI, T., YOSHIDA, N., and IDE, K. 1983. Varietal differences of the productivity in dual purpose type sorghum. (Ja). Bulletin of the Saitama Prefectural Livestock Experiment Station 23: 37-41.

0405 TRACRE, D. 1983. Contribution to the study of the curves responding to the azote of sorghum: varieties CE 90, ETSH3D1. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 42 pp.

0406 USA:MISSISSIPPI AGRICULTURAL AND FORESTRY EXPERIMENT STATION. 1983. Grain sorghum performance trials 1982. Bulletin, Mississippi Agricultural and Forestry Experiment Station 916: 1-17.

0407 VIATOR, H.P., HUTCHINSON, R.L., MARSHALL, J.G., RABB, J.L., and RILEY, T. 1983. Performance of grain sorghum hybrids in Louisiana, 1983. Report

of Projects, Louisiana Agricultural Experiment Station, Department of Agronomy. pp. 113-122.

Over twenty bird-susceptible and 7 bird-resistant hybrids were evaluated for grain yield. Data were also recorded for grain test-weight, heading date and head compactness. Information on soil type, fertilization, planting and harvesting dates, and plot size at each location is presented.

0408 VOIGT, R.L. 1983. Registration of AZ9504 sorghum germplasm (Reg. No. GP 134). Crop Science 23(3): 601.

The male sterile (A) and maintainer (B) lines of sorghum germplasm with the milo cytoplasmic-genic sterility (A1) system were released in 1969 by USDA-ARS and the Arizona Agricultural Experiment Station, USA. The lines were designated A AZ9504 and B AZ9504.

0409 YORK, J.O. 1983. Arkansas grain sorghum performance tests for 1982. Mimeograph Series, Arkansas Agricultural Experiment Station no. 305. 19 pp.

The tests were designed to compare hybrids under the existing environment. Data are presented for the 30-56 hybrids grown at 7 locations in Arkansas, USA.

0410 ZHU, F.S., FU, J.H., LI, L.C., and CHEN, S.B. 1983. Cytological study on the intergeneric hybrid between rice and sorghum. (Ch). Scientia Agricultura Sinica 4: 26-29. 16 ref. (Summary:En).

The observation of meiosis of PMCs and mitosis of root tip cells indicated that the female parent had 24 chromosomes including one pair of SAT, and the male parent had 20 chromosomes including 2 pairs of SAT, but most of the hybrid progenies had the same number of chromosomes as the female parent and 2 pairs of SAT chromosomes as the male parent. The satellite chromosome in the hybrid progenies, was dominant. The differences of the karyotype and chromosome Giemsa banding pattern between the hybrid and its parents were analysed by using the F-BSG chromosome banding technique. The Giemsa banding patterns of the hybrid were rich and complex with four more intercalary bands than its maternal parent. The ratio of heterochromatin in hybrid progenies was smaller than that of their parents.

AGROCLIMATOLOGY

0411 BENINCASA, M., LOPES, L.R., BENINCASA, M.M.P., and OLIVEIRA, A.S. DE. 1983. Some effects of topography on the microclimate and sorghum behaviour. (Pt). Ciencia e Cultura 35(4): 495-501. 19 ref. (Summary:En).

The effects of topography on incident solar radiation and the consequences of this variation on the growth of sorghum, by choice of two slopes under natural conditions, localized at 21 deg 51'22'' S and 48 deg 18'58'' WGr, were studied. The slopes were 5 deg 57' and 6 deg 56' or 10.5 and 12.5%, respectively at North and South aspects. The soil was latossol roxo and was homogeneous at seeding. It was verified that the North slope received more solar energy than South, with differences of 4.1 at the beginning and 11.6% at the end of the cycle. The soil temperature at surface and at 5.0, 10.0, 20.0 and 40.0 cm deep as well as the crop behaviour were afected by the differences in incident solar radiation. In addition, leaf

area, specific leaf area, dry matter accumulation, relative growth rate, and net assimilation rate were appreciably influenced, and consequently the grain production.

0412 BRAHMBHATT, B.M., and PATEL, A.S. 1983. Role of moisture conservation practices for semi-arid condition of Gujarat. Gujarat Agricultural University Research Journal 8(2): 58-66. 11 ref.

A field experiment was conducted during 1975-76 and 1976-77 at Gujarat, India under semi-arid condition to evaluate certain moisture conservation practices and subsequent utilization of moisture thus stored for sorghum and castor. Ridging and furrowing was found to be superior among different practices for conserving soil and moisture during crop growth period. Considering the values of both the seasons for test crops, hybrid sorghum 'CSH-1' and its ratooning gave the maximum production stability under both below and above average rainfall years. Recycling of runoff water was also found effective in increasing the yields. Runoff from the test crops was the highest in the case of shallow ploughing followed by deep ploughing and ridges and furrows. However, reverse was the trend in respect of soil loss in runoff water.

0413 DANCETTE, C. 1983. Estimation of the water requirements of main rainfed crops in the Sudano-Sahelian zone. (Fr). Agronomie Tropicale 38(4): 281-294. 61 ref. (Summaries:En,Es).

A simple method to determine the water requirement of crops including sorghum is presented. Characterization of evaporation demand, choice of crop coefficients K and calculation of water requirements by 10-day periods, from emergence rains to harvest are the steps for this method. Some applications related to the knowledge of water requirements are enumerated to determine water balance taking account of the climate, soil and plant to make a better use of available water resources.

0414 DE, R., BEEMIAH, G., RAMSHESHIAH, K., and RAO, Y.Y. 1983. Effect of mulches and antitranspirants on the grain yield of sorghum grown under limited irrigations on a deep Vertisol. Journal of Agricultural Science (UK) 100(1): 159-162. 5 ref.

Field experiments made for 2 years on a deep Vertisol under semi-arid conditions showed that soil-surface evaporation control by mulching with rice straw or transpiration suppression by foliar application of kaolin or atrazine increased the yield of grain sorghum. These materials decreased soil moisture depletion and thus increased water-use efficiency. Application of one irrigation at the boot-leaf stage was beneficial. No additional advantage was noted with two irrigations, one given 45 days after seeding and the other at anthesis.

0415 DEVITT, D., JURY, W.A., STERNBERG, P., and STOLZY, L.H. 1983. Comparison of methods used to estimate evapotranspiration for leaching control. Irrigation Science 4(1): 59-69. 11 ref.

In this study six different methods for controlling leaching by predicting crop water use were compared over a full season with sorghum in southern California, USA. The standard for comparison was a 1.8 m x 1.8 m lysimeter located in the center of the 1.4 ha field. The Penman equation was the

most successful of the methods which were tested with predicted evapotranspiration deviating + or - 15% on a weekly basis from measured lysimeter values. The other methods were less successful with errors ranging from + or - 23 to 48%. The influence of sprinkler system application uniformity on leaching uniformity was examined. Although the coefficient of uniformity of the sprinkler system was very high, the portions of the total area receiving the least amount of water were concentrated in a single area which coupled with the error involved in predicting evapotranspiration, seriously limited the minimum practical leaching fraction which should be attempted if maximum crop yields are desired.

0416 DI BARI, V., and RIZZO, V. 1983. Irrigated maize and sorghum on the Apulian lowland. (It). Informatore Agrario 39(12): 25093-25094, 25097-25098, 25101-25102, 25105-25107. 13 ref.

Availability of water, irrigation, and the effect of evapotranspiration on the growth of sorghum in Italy are discussed.

0417 DUGAS, W.A., ARKIN, G.F., and JACKSON, B.S. 1983. Factors affecting simulated crop yield spatial extrapolation. Transactions of the ASAE 26(5): 1440-1444. 22 ref.

The paper examines the influence of distance, elevation and monthly precipitation on variations of simulated corn and sorghum yields using meteorological data from a distant site for 2 plant extractable soil water levels.

0418 GARRITY, D.P., SULLIVAN, C.Y., and WATTS, D.G. 1983. Moisture deficits and grain sorghum performance: drought stress conditioning. Agronomy Journal 75(6): 997-1004. 22 ref.

A line source sprinkler system was used to apply 2 sets of treatments on 3 sorghum hybrids on a sandy soil in Nebraska, USA with gradient irrigation (G) applied throughout all growth stages (GGG) or full irrigation (I) during the vegetative and reproductive periods, followed by gradient irrigation during the grain-fill period (IIG). Grain yields for the GGG and IIG were the same. Much greater seasonal soil water depletion occurred in the GGG than in the IIG treatment, while soil water extraction during GGG was similar between the 2 treatments. DM and grain weight were much less sensitive to seasonal evapotranspiration deficits in the GGG than in the IIG treatment, but seasonal water-use efficiency in the GGG treatment was substantially higher. The magnitude of drought stress conditioning depended on the genotype, the phenological timing of the treatment, and the irrigation regimen employed.

0419 GONZALEZ HERNANDEZ, V.A. 1983. Sorghum responses to high temperature and water stress imposed during panicle development. Ph.D. thesis, University of Nebraska, Lincoln, Nebraska, USA. 201 pp.

The responses of two sorghum hybrids to water stress imposed for 5 or 6 days starting at the floret differentiation stage, were investigated over a range of temperatures under controlled environment conditions. Water stress inhibited photosynthesis and transpiration in the two sorghum genotypes, as well as caused losses of their functional leaf area, delayed their development rate during panicle expansion, and reduced their grain yield and seed number per head relative to the controls. The magnitude of some of

these effects of water stress varied with the temperature, the genotype and the culture medium.

0420 HAWS, L.D., INOUE, H., TANAKA, A., and YOSHIDA, Y. 1983. Comparison of crop productivity in the tropics and temperate zone. Pages 403-413 In Potential productivity of field crops under different environments (Smith, W.H., and Banta, S.J., eds.). Los Banos, Laguna, Philippines: IRRI. 1 ref.

Higher temperature during vegetative growth lowered the yield/unit, field area, and shortened the growth period yield/day in the tropics when compared with temperate areas. Sorghum and other crops produced 70-90 kg/ha day of primary photosynthate.

0421 HITAKA, N. 1983. Studies on the favorable region and cropping season for cultivation of grain sorghum in Japan. (Ja). Bulletin of the Chugoku National Agricultural Experiment Station, Series A 31: 23-88. 53 ref. (Summary:En).

Results of an agroclimatic research in Japan on favourable cropping seasons, adaptable varieties and the yields of sorghum are given.

0422 HUDA, A.K.S., REDDY, D.M., and SEETHARAMA, N. 1983. Effect of moisture stress on yield components of Sorghum bicolor (L.) Moench. Sorghum Newsletter 26: 129-130.

The study revealed that (1) the component growing most rapidly at the time of stress was most severely affected; (2) loss in a component due to early stress was compensated by the increase in number or size of the organ developing later after the release of stress; and (3) phenological changes can alter the yield components by either postponing or terminating the development of a particular component.

0423 JORDAN, W.R., DUGAS, W.A., JR., and SHOUSE, P.J. 1983. Strategies for crop improvement for drought-prone regions. Agricultural Water Management 7(1-3): 281-299. 61 ref.

Model predictions were made for Texas and Kansas, USA using daily weather data. Sorghum modifications included maturity, deep ratooning and enhanced osmoregulation. A yield advantage due to early maturity was predicted only in yr when yield was reduced at least 40% by low water supply. Yields of the deeper rooted crops exceeded those of the normal rooted crop by at least 20% in 20-38% of the yr across locations. The water use eficiency of deep rooted sorghum, expressed as gain yield/total crop water use, was significantly greater than the normal rooted crop, because of the additional water available later in the season when a high fraction of the total evapotranspiration occurs as transpiration.

0424 JOSHI, V.S. 1983. Influence of relative humidity, heat units and hours of sunshine on grain sorghum. Madras Agricultural Journal 70(7): 446-450. 5 ref.

It was found that the values of relative humidity were higher close to ground (5cm height) and the same decreased gradually as the height of observation increases. Panicle emergence to grain maturity is a critical period for final grain production of sorghum. If the accumulation of heat units, hours of sunshine and the relative humidity inside the crop canopy is maximum during this period higher grain yield can be obtained.

0425 MASON, W.K., MEYER, W.S., SMITH, R.C.G., and BARRS, H.D. 1983. Water balance of three irrigated crops on fine-textured soils of the riverine plain. Australian Journal of Agricultural Research 34: 183-191. 29 ref.

Maize, sorghum and sunflower were grown in 3 different soils of south-eastern Australia. At each site, above-ground growth, phenological development, and root length density were measured in 2 well-watered plots. Water use, plant water status and final crop yield were measured in the well-watered plots and in one plot per site where irrigation was discontinued around the time that complete crop canopies had developed. Capillary rise from shallow water tables supplied considerable quantities of water to the crops. The water balance model was used to predict actual evapotranspiration. At the site without a water table, yields from the drying-cycle plots were severely reduced and the estimate of plant available water was thought to be realistic. It is concluded that where capillary rise of lateral movement of water into the root zone was significant, the concept of plant available water was unsatisfactory.

0426 NATH, S., and JOHNSON, W.H. 1983. A model of field grain sorghum moisture contents. Agricultural Mechanization in Asia, Africa and Latin America 14(2): 21-24. 4 ref.

This study establishes a mathematical relationship between grain moisture and time for estimating field grain moistures of grain sorghum during the harvest season. The model predicts grain moisture from a known reference moisture with or without the influence of rainfall. It can predict the number of days required for grain moisture to reduce from one level to any other. The model is somewhat specific for location, but can be easily adapted knowing localized drying rates.

0427 NEILD, R.E., LOGAN, J., and CARDENAS, A. 1983. Growing season and phenological response of sorghum as determined from simple climatic data. Agricultural Meteorology 30(1): 35-48. 12 ref.

Daily weather parameters computed from monthly climatic summaries were used to determine the time and length of growing season and evaluate the phenological response of sorghum in temperate and tropical regions. Comparisons were made using data from Fairbury, Nebraska, USA and Beijing, China, and Hyderabad, India and Villahermosa, Mexico, 2 temperate and 2 tropical locations, respectively, near the same latitude on opposite sides of the Earth. The rate of crop development and the amount of rainfall normally expected during various phenological stages differed greatly with time of planting at seemingly similar locations.

0428 O'TOOLE, J.C., and HATFIELD, J.L. 1983. Effect of wind on the crop water stress index derived by infrared thermometry. Agronomy Journal 75(5): 811-817. 13 ref.

The upper limit of Tf-Ta and attendant micrometeorological variables on severely water stressed sorghum, corn, and bean grown on a Typic Xerorthent, and cotton grown on a Typic Torriorthent were measured. Actual measured values of the upper limit of Tf-Ta ranged from 2.5 to 8.5 deg C across crops. The poor agreement between actual and calculated values was analyzed with respect to

net radiation, VPD, and windspeed. Windspeed was found to be the primary factor causing erroneous estimation of the upper limit of Tf-Ta and hence CWSI values. Crop water stress index values measured at low windspeed overestimated the level of water stress while those measured at high windspeed underestimated it. Crop specific changes in the boundary layer resistance-windspeed relationship partially explained the discrepancy between measured and calculated Tf-Ta upper limit values. Modification of the CWSI to account for the influence of windspeed is discussed.

0429 PREECHA PRAMMANEE. 1983. Measurement of evapotranspiration on sorghum and sweetcorn and their estimates by meteorological data. (Thai). M.S. thesis, Kasetsart University, Bangkok, Thailand. 175 pp. 75 ref. (Summary:En).

0430 RAO, G.R., MANIYAR, V.G., VAIDYA, J.G., and GHONSIKAR, C.P. 1983. Energy balance studies in sorghum. Journal of Maharashtra Agricultural Universities 8(3): 249-253. 4 ref.

The results of the study revealed that the net radiation available to the crop in mostly shared between latent heat (evapotranspiration) and sensible heat fluxes. The evapotranspiration was similar to the net radiation during day time when soil moisture content was above 25%. Higher quantum of sensible heat flux was generated during dry spell period. Latent heat flux accounted for 75.67% of net radiation, while sensible heat flux transferred to the atmosphere was 18.73% of net radiation during the crop season. The soil heat flux was directed downwards from soil surface throughout the crop period and the average % at soil heat flux was 2.97 of net rediation. The percentage of net radiation used in photosynthetic process by the crop was 2.6. The average depletion of net radiation in sorghum was 53.13% of that received at the top of fully developed canopy.

0431 RAO, G.R., TANGADE, R.G., and GHONSIKAR, C.P. 1983. Photosynthetically active radiation spectra of sorghum and groundnut. Indian Journal of Agricultural Sciences 53(8): 649-658. 5 ref.

In field-grown sorghum and groundnut, there was a decrease in the visible albedo (380-750 nm) and an increase in the near-infrared albedo (750-1550 nm) with crop development. The visible albedo varied from 0.06 at the initial stage of crop growth to 0.03 at crop development, the near-infrared albedo varied from 0.10 to 0.25. From a fully developed canopy of post-rainy-season 'CSH 8R' sorghum, the total flux density of solar radiation in the visible range was 0.118 ly/min. The reflected flux density was 0.017 ly/min in the visible range and 0.030 ly/min in the near-infrared range. Nearly 5.67% of the visible radiation and 25.42% of the near-infrared radiation incident on the crop canopy was reflected. These reflection values for a fully developed 'CSH 6' sorghum grown during the rainy season were 4.6% in the visible range and 21.4% in the near infrared range. The study suggests that the quantum of anti-transpirant or reflectant material applied on crops should differ with the plant type.

0432 RAVINDRANATH, P., and RAJ, A.S. 1983. Effect of moisture stress on growth, yield and yield components of field-grown sorghum varieties having glossy and non-glossy leaves. Indian Journal of Agricultural Sciences 53(6): 428-430. 7 ref.

When stress was imposed by withholding water, the leaf-area index, crop growth rate, net assimilation rate and grain yield decreased in sorghum varieties 'IS 3962', 'M 35-1', 'IS 2394' having glossy (light-green) leaves as well as in 'IS 474' and 'CS 3541' having non-glossy (dark-green) leaves, although glossy types gave more yield. Grain yield was mostly controlled by leaf-area index.

0433 SAKSENA, A., and BHARGAVA, P.N. 1983. Suitability of kharif crops to agroclimatic conditions of Jamnagar. Annals of Arid Zone 22(2): 143-150. 3 ref.

On the basis of the data on productivity of crops, rainfall, evaporation and soil characteristics, it was observed that Jamnagar, India had a safe crop growing season of 17 weeks from 25th to 40th standard week. Performance of groundnut was found better than that of sorghum. Critical examination of weekly Moisture Availability Index (MAI) showed that if there are 8 or more weeks with MAI>50 during the entire crop season, yields of crops were normal. Reduction of even one or two weeks resulted in a severe reduction in the yields of sorghum. Fitting of requirement and availability of soil moisture showed that sorghum should be sown around 26th week.

0434 SCARASCIA, M.E.V., MASTRORILLI, M., and PALOSCIA, S. 1983. Environmental factors and energy balance of the sorghum crop. (It). Rivista di Agronomia 17(1, suppl.): 149-154. 9 ref. (Summary:En).

Two sorghum crops were grown under different soil moisture conditions in South Italy. The micrometeorological factors were recorded by a digital data logger along with the components of the energy balance for one month. Leaf temperature, leaf water potential, stomatal resistance, leaf transpiration flux and the soil moisture fluctuations were also measured. For a sorghum canopy in arid environment, the control of the transpiration by stomata, following the reduction of the moisture content in leaf tissues, occurs, thus influencing the components of the crop energy balance; the Bowen ratio H/LE, as soil water content is being progressively depleted.

0435 SEETHARAMA, N., SINGH, S., SIVAKUMAR, M.V.K., REDDY, B.V.S., HUDA, A.K.S., SRIVASTAVA, K.L., PEACOCK, J.M., and HOUSE, L.R. 1983. Performance of postrainy-season sorghum under stored soil moisture environments in India. Presented at the Symposium on Agrometeorology and Optimization of Crop Yield for Sustained Growth, International Conference on Biometeorology, 26-30 December 1983, New Delhi, India. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0436 SEILER, R.A. 1983. A yield model for grain sorghum on the basis of crop responses to prevailing weather and climatic conditions. Ph.D. thesis, University of Missouri, Columbia, Missouri, USA. 199 pp.

A crop model to predict yield of grain sorghum was developed for the west-central region of the United States. Crop yield data and meteorological data were used in a chi-square technique to discriminate between variables affecting yield of grain sorghum and the most critical phenological stages. The significant variables, over the identified critical periods, were used as candidate predictors of yield in a correlation-regression analysis. The model explained 77% of the

sorghum yield variability, with a root mean square error of 816.0 kg/ha. The predictive capabilities of the model tested with an independent data set showed that the predictions were within 15% of the observed yields in 75% of the testing years and in one-half of these years, errors were less than 10%.

0437 SHACKEL, K.A., and HALL, A.E. 1983. Comparison of water relations and osmotic adjustment in sorghum and cowpea under field conditions. Australian Journal of Plant Physiology 10(4-5): 423-435. 20 ref.

Seasonal and diurnal patterns of xylem pressure potential, (A) and osmotic potential (B) were compared using contrasting genotypes of sorghum and cowpea under wet and dry field conditions. Generally, differences in A and B among genotypes within each species were small compared with differences between the 2 species. Sorghum exhibited a larger diurnal range and larger differences between wet and dry treatments for A, B, and estimates of bulk leaf turgor than did cowpea. Seasonal and drought-induced osmotic adjustment occurred in sorghum, but not in cowpea. Sorghum maintained moderate values of leaf conductance throughout the day under the dry treatment. Cowpea exhibited a larger diurnal range of leaf conductance and larger differences between wet and dry treatments than did sorghum. Differences were not observed in overall soil water depletion or in root activity. The sorghum genotype that had the lowest B also had the lowest conductance and the least soil water depletion.

0438 SIDHU, M.S., and GILL, G.S. 1983. Effect of weather on seed production of sorghum. Journal of Research, Punjab Agricultural University 20(4): 415-422. 8 ref.

The effect of weather on seed yield of sorghum was studied for 3 years. It was observed that sorghum raised for seed production was very sensitive to weather conditions. Rainfall of less than 40 cm during the growing season produced satisfactory seed yield whereas more than 40 cm rainfall produced only 90 q/ha or less. The high rainfall particularly during germination and reproductive stage of growth had an adverse effect of seed yield. High humidity, low temperature and high wind velocity (4 km/hr) during reproductive stage of growth were found unfavourable for seed crop. Among the different regions of Punjab, India, Ferozepur district was found most suitable for seed production of sorghum.

0439 WRIGHT, G.C., and SMITH, R.C.G. 1983. Differences between two grain sorghum genotypes in adaptation to drought stress. II. Root water uptake and water use. Australian Journal of Agricultural Research 34(6): 627-636. 17 ref.

A study of sorghum hybrids, E-57 and TX-671, indicated that differences in grain yield under conditions of low rainfall were associated with increased extraction of soil water at depth. E-57 used less water before anthesis than did TX-671, which was more than compensated for by increased water use after anthesis. As soil water declined in a drying cycle, TX-671 tended to restrict its water use at a higher water content than E-57.

0440 YADAV, R.C., KUMAR, V., and OGUNLELA, V.B. 1983. Biological water harvesting: a method of enabling dryland crops to endure periods of drought. Journal of Arid Environments 6(2): 115-117. 4 ref.

Crop canopies of maize and sorghum were observed to harvest rain water at the rate of 7-29 ml/mm rainfall. Influence of the crop growth stage, the amount of rainfall on biological water harvesting and its possible effect on intervening drought periods, are discussed.

SOIL SCIENCE

0441 ABRUNA, F., RODRIGUEZ, J., and SILVA, S. 1983. Crop response to soil acidity factors in Ultisols and Oxisols in Puerto Rico. VI. Grain sorghum. Journal of Agriculture of the University of Puerto Rico 67(1): 28-38. 16 ref.

Sorghum responded strongly to liming in yield on two Ultisols and one Oxisol. The response was stronger on the Ultisols than on the Oxisol. On the Ultisols, yields of grain produced by a seed and a ratoon crop decreased as the percent AI saturation of the soil increased, averaging only 861 kg/ha on the Corozal clay, and only 428 kg/ha on the Corozal subsoil at the highest AI saturation percentage, as compared to 5,255 and 3.969 kg/ha with no AI, respectively. On the Oxisol, the yields were not so drastically reduced because the highest AI saturation attained was only 34%. On all soils, yields increased with increasing pH, and decreased as the AI/base ratio increased. The P content of the leaves decreased significantly with increasing soil acidity and was highly correlated with grain yields of the seed crop on the Ultisols. The Ca content of the leaves was not correlated with soil acidity factors, nor was it correlated as closely with yields as has been shown in crops such as soybean and corn.

0442 HAILE, M. 1983. Assessment of the availability of soil phosphorus in Alfisol and Vertisol at ICRISAT Center for sorghum growth. M.Sc. thesis, Addis Ababa University, Addis Ababa, Ethiopia. 107 pp.

The available soil P in Alfisol and Vertisol at ICRISAT Center, India was assessed by using 9 different extracting methods. The amount of P extracted from the Alfisols by Olsen's method and the Electro Ultra Filtration method had highest and significant correlation with grain and % yield. Water extractable P showed highest and significant correlation with grain yield, % yield and total P uptake on the Vertisols.

0443 KONATE, M.B. 1983. The existing sorts of parcelling in the region of Gao: reflections and suggestion to improve them [sorghum]. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 37 pp.

0444 RAMANATHAN, K.M., RAMANATHAN, S., JAYARAMAN, C., RAVIKUMAR, V., and PALANIVEL, S. 1983. Effect of chiseling and amendments on the management of soils having impervious layer at shallow depths. Madras Agricultural Journal 70(4): 246-250. 6 ref.

The results of the experiment revealed that both chiseling at closer intervals and the addition of amendments like groundnut husk and rice husk had increased the yield of sorghum grain and straw over control. The physical properties of the soil viz., bulk density, stability index and hydraulic conductivity examined at the post harvest stage were also found to be improved considerably due to chiseling and addition of organic amendments.

0445 SANCHEZ, P.A. 1983. Productivity of soils in rainfed farming systems: examples of long-term experiments. Pages 441-465 In Potential productivity of field crops under different environments (Smith, W.H., and Banta, S.J., eds.). Los Banos, Laguna, Philippines: IRRI. 65 ref.

In Sudan-Sahel area of West Africa sorghum yield was limited by soil hardening and lack of humus.

0446 SONAR, K.R., SHINDE, S.S., KUMBHAR, D.D., PATIL, B.P., and PATIL, N.D. 1983. Soil test crop response correlation studies on sorghum. Sorghum Newsletter 26: 60. 1 ref.

Field experiments were conducted on sorghum at 7 locations varying in soil fertility during the monsoon season in Maharashtra, India. Plant and soil samples were analyzed for N, P, and K and grain and straw yields were recorded. Fertilizer equations given for determining NPK requirements of sorghum are: N=4.04 T-0.22 SN; P205= 2.72 T-8.26 SP; and K20=3.82 T-0.17 SK.

0447 TOUCHTON, J.T., and COPE, J.T. 1983. Residual fertility and grain sorghum production. Sorghum Newsletter 26: 64-66. 1 ref.

Fertilizer rate studies established in 1929 at several locations of Alabama, USA are used for soil test calibration purposes. There was an unusual vegetative response of sorghum to P. Except for the Dewey soil, omitting lime resulted in severe reductions in grain sorghum yields. Micronutrients did not improve sorghum yields. Inadequate S limited sorghum yields. Data on one-year sorghum and 2 or 3-year corn yields from 6 soils as affected by soil P levels and P fertilizers, soil test K levels and by various fertilizer treatments are presented.

0448 VADIVELU, S., LANDEY, R.J., and KALBANDE, A.R. 1983. Soil physiographic relationship and its impact on land use - a case study. Journal of Maharashtra Agricultural Universities 8(1): 16-19. 11 ref.

The soils of Aurangabad district, Maharashtra, India have been mapped and described. The soil series identified in the area are specific to the geomorphic units establishing the soil physiographic relationships. The soils and land use on various geomorphic units have been studied. The hill range with shallow soils are mostly under forest with patches of rainfed crops. The pediment surfaces with shallow to deep soils are cultivated to sorghum, pearl millet and safflower. The soils occurring on piedmont plains and flood plain are very deep and are cultivated to sorghum, cotton and safflower under rainfed condition and sugarcane and vegetable crops under irrigated conditions.

SOIL MICROBIOLOGY

0449 AL-RADDAD, A.M. 1983. Studies on the activity of endotrophic mycorrhizae in relation to host-fungus-combination [in sorghum, cotton, beans, etc.]. (De). Thesis, Hannover University, Hannover, Federal Republic of Germany. 95 pp.

0450 GASKINS, M.H., HUBBELL, D.H., and ALBRECHT, S.L. 1983. Interactions between grasses and rhizosphere nitrogen-fixing bacteria. Pages 324-329 In Proceedings of the Fourteenth International Grassland Congress,

15-24 June 1981, Lexington, Kentucky, USA (Smith, J.A., and Hays, V.W., eds.). Boulder, Colorado, USA: Westview Press. 13 ref.

Sorghum and Digitaria decumbens cv. were inoculated with a strain of Azospirillum to estimate the quantity of energy substrats obtained by rhizosphere organisms from plants. The growth hormones produced by Azospirillum was responsible for plant growth rather than N fixation.

0451 GILLER, K.E., WANI, S.P., KIPE-NOLT, J.A., DAY, J.M., DART, P.J., and AVALAKKI, U.K. 1983. Nitrogen fixation associated with the roots of sorghum and millet. Presented at the Fifth International Symposium on Nitrogen Fixation, 28 August - 3 September 1983, Noordwijkerhaul, Netherlands. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0452 KRISHNA, K.R., DART, P.J., and SUNDARAM, K.G.P. 1983. Screening for the efficiency of vesicular arbuscular mycorrhizal fungi on pearl millet and sorghum. Presented at the Sixth Southern Regional Microbial Inoculants Meeting, 22-23 September 1983, University of Agricultural Sciences, Bangalore, India. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0453 KROTZKY, A., BERGGOLD, R., JAEGER, D., DART, P.J., and WERNER, D. 1983. Enhancement of aerobic nitrogenase activity (acetylene reduction assay) by phenol in soils and the rhizosphere of cereals. Zeitschrift fuer Pflanzenernaehrung und Bodenkunde 146(5): 634-642. (Summary:De).

By addition of phenol at concentrations between 0.1 and 10 mmol/l nitrogenase activity (acetylene reduction assay) is enhanced by a factor of 5 in the rhizosphere of pearl millet incubated under 20% 02. Excised roots of Sorghum nutans CSH5 failed to show any phenol enhancement of nitrogenase activity. After a preincubation of 6 h, inhibition of nitrogenase activity under air by addition of 1 mmol/l was much more pronounced than under microaerobic conditions.

0454 LIN, W., OKON, Y., and HARDY, R.W.F. 1983. Enhanced mineral uptake by Zea mays and Sorghum bicolor roots inoculated with Azospirillum brasilense. Applied and Environmental Microbiology 45(6): 1775-1779. 15 ref.

Corn and sorghum plants grown to maturity on limiting nutrients in the greenhouse showed improved growth from inoculation similar to that of plants grown on normal nutrient concentrations. Enhanced ion uptake may be a significant factor in the crop yield enhancement reported for Azospirillum inoculation.

0455 MCCLUNG, C.R., VAN BERKUM, P., DAVIS, R.E., and SLOGER, C. 1983. Enumeration and localization of N2-fixing bacteria associated with roots of Spartina alterniflora Loisel. Applied and Environmental Microbiology 45(6): 1914-1920. 24 ref.

The recoveries of rhizoplane bacteria were compared among Spartina alterniflora growing in a salt marsh and field-grown sorghum and maize after treatments of the roots with chloramine-T or NaOCl. Roots of S. alterniflora supported appreciable rates of nitrogenase activity, but rates of acetylene reduction by roots of sorghum and maize were negligible.

0456 MURTY, M.G. 1983. Nitrogen fixation (acetylene

reduction) in the phyllosphere of some economically important plants. Plant and Soil 73(1): 151-153. 10 ref.

Nitrogen fixation on leaf surfaces of sorghum and other plants was determined by using acetylene reduction assay. The data revealed varying levels of positive nitrogenase activity on the surfaces. Azotobacter was observed to be the predominant diazotroph on the leaves. No correlation between fixation rates and C3 and C4 plant species was discerned. The possibility of improving phyllosphere nitrogen fixation has been discussed in light of the above observations.

0457 O'HARA, G.W., DAVEY, M.R., and LUCAS, J.A. 1983. Association between the nitrogen fixing bacterium Azospirillum brasilense and excised plant roots. International Journal of Plant Physiology 113(1): 1-13. 41 ref.

Inoculation of vial-fed liquid and sand-vermiculite cultures of excised roots of sorghum, pearl milet, maize, and Phaseolus vulgaris with Azospirillum brasilense strains was followed by attachment of bacteria to root hairs and epidermal cells. Tetrazolium staining indicated bacteria to be present in the rhizosphere and endorhizosphere. There was no invasion of the stele of intact roots by Azospirillum. Approximately 1 x 10(7) bacteria were associated with each root explant within 7 days of inoculation, bacterial numbers declining after this period. Nitrogenase activity, as determined by acetylene reduction, was detected only in roots inoculated with Azospirillum strain Sp 7 in mineral salts saturated sand-vermiculite cultures, although there occurred wide variation between explants. Acetylene reduction was not detected in control cultures and in roots inoculated with the mutant bacterial strains SpF 104 and SpF 105.

0458 PERA, A., VALLINI, G., SIRENO, I., BIANCHIN, M.L., and BERTOLDI, M. DE. 1983. Effect of organic matter on rhizosphere microorganisms and root development of sorghum plants in two different soils. Plant and Soil 74(1): 3-18. 40 ref.

Composted organic matter from the biodegradable fraction of solid urban waste mixed with urban sewage sludge was added in increasingly large doses to pliocenic clay and alluvial sandy soils. Analyses were carried out during the vegetative cycle of a forage sorghum variety to find out the relations among concentration of organic matter, plant development and evolution of certain physiological groups of microorganisms in the sorghum rhizosphere. The effect of compost on root development and soil structure are also analysed.

0459 SAIF, S.R. 1983. The influence of soil aeration on the efficiency of vesicular-arbuscular mycorrhizas. II. Effect of soil oxygen on growth and mineral uptake in Eupatorium odoratum L., Sorghum bicolor (L.) Moench and Guizotia abyssinica (L.f.) Cass. inoculated with vesicular-arbuscular mycorrhizal fungi. New Phytologist 95(3): 405-417.

Oxygen concentrations in the soil atmosphere influenced growth and mineral uptake in Eupatorium odoratum, sorghum and Guizotia abyssinica inoculated with Glomus macrocarpus, Glomus mosseae and 'white reticulate'. Shoot and root dry weights of mycorrhizal plants increased with O2 concentration upto 16%. Mycorrhizal plants contained higher quantities of

mineral elements than did non-mycorrhizal plants and took up more nutrients as soil O2 concentrations increased. Soil O2 did not influence the P concentrations of plants. Inoculation increased the concentration of Mg in sorghum. The concentrations of Ca and Mg in sorghum showed positive responses to increase in soil O2. The development of Glomus macrocarpus, Glomus mosseae and 'white reticulate' exhibited quantitative and qualitative responses to different soil O2 concentrations.

0460 SCHANK, S.C., SMITH, R.L., and LITTELL, R.C. 1983. Establishment of associative N2-fixing systems. Proceedings of the Soil and Crop Science Society of Florida 42: 113-117. 23 ref.

Seedlings of 5 sorghum genotypes were inoculated with 4 strains of bacteria. The degree of association was evaluated by visually rating the amount and location of bacterial growth and by assaying for acetylene reduction activity (ARA). Active ARA associations were established 83% of the time, in that tubes with plants had higher ARA than the no plant controls. The ARA rates in these pre-established systems were equivalent to 2 non-autoclaved, but highly active natural soils from Putnam and Madison Counties, USA which were included as standards because of their high ARA. Intact soil-plant cores from the mason jar assemblies were transplanted into a field with low ARA and were re-assayed for ARA 2 more times. Highest ARA was from the natural soil-plant transplants, with lower rates from all inoculated treatments. This suggests that the complex natural systems are better able to persist in competitive situations, than the inoculated associations established from selected N2-fixing strains.

0461 SCHMIT, V. 1983. Study of the influence of the symbiosis food legume/rhizobium on associated Sorghum bicolor (L.) Moench/Vigna unguiculata (L.) Walp. (Fr). Bulletin des Recherches Agronomiques de Gembloux 18(4): 231-239. 5 ref. (Summary:En).

The observation of the yield components showed the positive influence of the inoculation of cowpea, either in pure mixed stand. The lack of mutual cooperation between sorghum and cowpea did not allow to establish a possible transfer of nitrogen from cowpea to the cereal.

0462 VOSE, P.B. 1983. Developments in nonlegume N2-fixing systems. Canadian Journal of Microbiology 29(8): 837-850. 108 ref.

The bacterial associations in sorghum and millets and other systems are discussed. Quantifying nitrogen fixation by associate systems, the nature of diazotrophic rhizocoenoses, improving associative nitrogen fixation, economic importance and future research and development are also discussed.

0463 WANI, S.P., DART, P.J., and UPADHYAYA, M.N. 1983. Factors affecting nitrogenase activity (C2H2 reduction) associated with sorghum and millet estimated using the soil core assay. Canadian Journal of Microbiology 29(8): 1063-1069. 17 ref. (Summary:Fr).

Plants grown in iron cores in the field and then assayed had significantly higher activity than plants cored at the time of assay. Mechanical disturbance during transportation of the cores reduced the activity significantly. Any delay between cutting off the plant top and injecting C2H2 gas

led to a reduction in the level of nitrogenase activity determined. Diurnal variation in nitrogenase activity was noted but was not correlated with soil temperature. Most activity occurred at the end of photoperiod. Seasonal variation in nitrogenase activity of plants was observed and was correlated with the ontogenetic development of the host plant, being most at flowering. A low but significant correlation existed between soil moisture content and nitrogenase activity associated with the plant.

WATER MANAGEMENT

0464 ANGUS, J.F., HASEGAWA, S., HSIAO, T.C., LIBOON, S.P., and ZANDSTRA, H.G. 1983. The water balance of post-monsoonal dryland crops. Journal of Agricultural Science (UK) 101(3): 699-710. 12 ref.

Six dryland crops including sorghum and 2 rice CVs. were grown under rainfed and irrigated conditions on a dryland site with a clay loam soil at IRRI, Philippines. After the first 30 days of growth there was no effective rain, and the rainfed crops encountered different water deficits. Sorghum yielded seed under rainfed conditions but gave higher yields under irrigation. The different amounts of stored soil water were associated with different growth durations, rooting depths and rates of soil water depletion from within the root zone. Biological productivity of the photosynthetic pathway was linearly related to transpiration. The different seed yields of the rainfed crops were due to differences in harvest index and the chemical composition of seeds, as well as to biological productivity. The results are discussed in relation to the potential for growing dryland crops after rice in rice-based cropping systems.

0465 AWASARMAL, B.C., BHARAMBE, P.R., and SHINDE, J.S. 1983. Consumptive use and water use efficiency of different crops grown on a Vertisol under rainfed condition. Journal of Maharashtra Agricultural Universities 8(2): 187-188. 5 ref.

The differences in consumptive use and water use efficiency in crops studied including sorghum was due to genetic variability in plant types and yield potentials of different crops.

0466 DALLYN, P. 1983. Crop water requirements under arid conditions. Pages 383-392 In More food from better technology (Holmes, J.C., and Tahir, W.M., eds.). Rome, Italy: FAO.

The studies were conducted on sorghum and other crops in the Middle East and Africa over 20 yr. Yield of sorghum was highest with 10 cm irrigation water every 14 days.

0467 FARAH, S.M. 1983. Effects of supplementary irrigation on rain-grown sorghum (Sorghum bicolor) in the Sudan. Journal of Agricultural Science (UK) 100(2): 323-327. 10 ref.

Effects of supplementary irrigation at 3 periods of sorghum development (a) from emergence to a time after floral initiation was completed (b) during heading and flowering and (c) from ending of flowering to maturity, during two seasons, were tested. Grain yield and its components and straw yield were significantly affected by the irrigation treatments, which were themselves considerably affected by

rainfall. Water deficits affected grain yield primarily through effects on number of grains during the first period and size of grains in the second period. Effects in the third period were apparently complementary to those of the first and/or the second periods, being either very substantial or negligible, depending on the rain conditions in these periods. Straw yields were mostly affected by irrigation during the third period, mainly as a result of development of late tillers. High yields of rain-grown sorghum can be obtained if water deficits are avoided by supplementary irrigation during one or more of its growth periods.

0468 GUINEA:GOUVERNEMENT DE LA REPUBLIQUE POPULAIRE REVOLUTIONNAIRE DE GUINEE, and BURKINA FASO:BUREAU DES NATIONS UNIES POUR LA REGION SOUDANO-SAHELIENNE. 1983. Project: small earth dams [Guinea, sorghum, irrigation]. (Fr). Ouagadougou, Burkina Faso: Bureau des Nations Unies pour la Region Soudano-Sahelienne. 66 pp.

0469 HARRIS, T.R., MAPP, H.P., and STONE, J.F. 1983. Irrigation scheduling in the Oklahoma Panhandle: an application of stochastic efficiency and optimal control analyses. Technical Bulletin, Oklahoma Agricultural Experiment Station no. T-160. 103 pp. 50 ref.

0470 HATFIELD, J.L. 1983. The utilization of thermal infrared radiation measurements from grain sorghum crops as a method of assessing their irrigation requirements. Irrigation Science 3(4): 259-268. 14 ref.

Field studies were conducted at California, USA to estimate water use and detect crop stress. Stress-degree-day index was an indicator of crop stress. The difference in canopy-air temperature was related to leaf water potential. Measurements of the plant water stress was included as compensation for environmental variability and to improve the stress-degree-day index. Remote sensing of thermal relations could be incorporated into irrigation measurement.

0471 JURY, W.A., STOLZY, L.H., FOX, C.A., VAUX, H.J., JR., and STRAUGHAN, I.R. 1983. Using 'blowdown' water to irrigate crops. California Agriculture 37(3-4): 4-5.

The feasibility of reusing power plant cooling water for irrigation was studied in California, USA. Alternate crops of wheat and sorghum were grown in 3 levels of dissolved salts within the range of anticipated concentrations in power plant effluent. Minimum leaching conditions maximized the salinity effect on the crops and minimized pollution of the drainage water. This irrigation set up though not profitable was less expensive than disposing of cooling water by evaporation.

0472 LO CASCIO, B., and DEL PUGLIA, S. 1983. Water deficit and grain sorghum yields. (It). Irrigazione 30(2): 39-44. 13 ref. (Summary:En).

Irrigation experiments on sorghum revealed that the best period for maximum yields was between tillering and the beginning of the heading stage and between flowering and the milk stage. Beyond this stage the yields were not significantly affected by irrigation.

0473 LOMTE, M.H., and DABHADE, R.S. 1983 Performance of rabi cultivars under limited water supply. Sorghum Newsletter 26: 21-22.

An experiment was conducted to study the performance of sorghum varieties M35-1 and SPP-86 and hybrid CSH-8R under command area of different irrigation projects in Maharashtra, India. CSH-8R was more responsive to irrigation and gave higher mean grain yield compared to M35-1 and SPV-86. Mean grain yield in one irrigation at flower primordia initiation stage (FPI), one irrigation at boot, and 2 irrigations at FPI + boot stage increased by 24, 40, and 65% over no irrigation. M35-1 gave higher fodder yield. Fodder yield increased with irrigation level. CSH-8R or SPV-86 are recommended under the command area of irrigation project with limited water supply.

0474 OMER, A.B. 1983. Agricultural engineering [Minimum cultivation for sorghum under supplementary irrigation, Kenana, Sudan]. Pages 69-71 In Annual report, 1978-1979. Kenana, Sudan: Kenana Research Station.

0475 PREMSEKHAR, M., and IRUTHAYARAJ, M.R. 1983. Influence of irrigation and mulches on nutrient uptake by sorghum. Sorghum Newsletter 26: 51-52. 2 ref.

Study showed that irrigation treatment at 4% available soil moisture upto the 45th day and then irrigation at 60% upto 90th day with the sorghum straw mulch preserved more moisture to make N P K more available for increased yield.

0476 SCARASCIA, M.E.V., LOSAVIO, N., and MASTRORILLI, M. 1983. Growth and development patterns of grain sorghum (Sorghum vulgare Pers.) grown on different irrigation water levels. (It). Rivista di Agronomia 17(3): 382-391. (Summary:En).

Sorghum was grown in Italy in an area of high evapotranspiration (ET), with different total irrigation rates applied at the crop growth stages. The reduction in leaf area was due to a smaller mean leaf area of each leaf. Lower biomass production and CGR were due to a smaller leaf expansion. With the higher irrigation rates, DM content was highest in the stems. Yields and yield components increased with increasing irrigation upto a level of 300 mm/ha, above which they remained constant. NAR did not differ between treatments.

0477 STEWART, B.A., MUSICK, J.T., and DUSEK, D.A. 1983. Yield and water use efficiency of grain sorghum in a limited irrigation-dryland farming system. Agronomy Journal 75(4): 629-634. 13 ref.

When sorghum was grown on this system on a clay loam soil during 1979-81 at Texas, USA, water utilization efficiency was higher than in conventional irrigation and water losses through evaporation, percolation and runoff were reduced. Grain yield increased significantly.

0478 THEVENET, G., DE BOISSON, J., BARET, F., and JACQUIM, CL. 1983. Water, maize, and sorghum. (Fr). Producteur Agricole Francais 59(332): 31-32.

AGRONOMY AND CULTIVATION

General

0479 ANONYMOUS. 1983. A plea for sorghum [cultivation, yields]. (Fr). Cultivar 158: 55.

0480 ANONYMOUS. 1983. Grain sorghum grows well where maize can fail. (Pt). Dirigente Rural

(Brazil) 22(5): 20, 23.

0481 ALI, M.S. 1983. Agronomy (Kenaf; groundnut; sorghum; sesame; maize, long term experiment at Kenana, Sudan). Annual report, 1978-1979. Kenana, Sudan: Kenana Research Station. pp. 1-13.

0482 AUGSBURGER, H.K.M. 1983. Mechanized crop production, Kingdom of Saudi Arabia. Mechanization of sorghum, groundnuts, and maize in the southern Tihama. Rome, Italy: FAO. 33 pp.

0483 BA-ZARAA, M.A. 1983. Role of shelter belts in the increase of agricultural production [sorghum] at Bir-Ahmed, El-Flush. Wadi Hadhramant in Democratic Yemen. (Ar). Yemen Agricultural Research Journal 1(1): 23-28. 4 ref. (Summary:En).

0484 BETANCOURT, V.A., and MILLER, F.R. 1983. A new sorghum program in the tropical southern area of Mexico. Sorghum Newsletter 26: 40.

Describes a research program initiated to determine sorghum productivity at Quintana Roo and Tabasso, tropical Mexico. The objectives were: (1) To achieve optimum land preparation with no loss of available moisture of soil. (2) To determine the yield potential of the tropically adapted sorghums. (3) To develop a production system so that the land can be used throughout the entire growing season using sorghum as a second crop.

0485 BOIRE, A. 1983. Study of the agronomic profitability of the parcelling project of Dankoussa plain [in Mali for the cultivation of rice, sorghum, and vegetables]. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 42 pp.

0486 BOTSWANA:DRYLAND FARMING RESEARCH SCHEME. 1983. Phase III, fourth annual report, December 1983. Sebele, Gaborone, Botswana: Agricultural Research Station. 344 pp. 25 ref.

The report covers the 1982-83 season and completed work up to Nov. 1982 on sorghum. It provides a detailed record of the experimental environment, agronomic crop spacing studies, microenvironment and crop physiology, sorghum/cowpea intercropping, soil physics and tillage and water conservation trials.

0487 DEIDDA, M., and SPANU, A. 1983. Experiments on maize and sorghum for grain in Sardinia. (It). Informatore Agrario 39(12): 25109-25112, 25115-25117. 13 ref.

Information on selection of hybrids and cultivation of sorghum in Italy is given.

0488 ESECHIE, H.A. 1983. Relationship between lodging, certain morphological characters and yield of grain sorghum (Sorghum bicolor L. Moench). Journal of Agricultural Science (UK) 101(3): 669-673. 11 ref.

Studies were conducted in two consecutive years at Mead, Nebraska, to investigate the relationship between lodging, certain morphological characters and grain yield of sorghum. Morphological characters correlated with lodging were plant height, length of pre-peduncle internode and rind thickness. Lodging was negatively correlated with number of days from sowing to 50% bloom and grain yield but was not correlated with grain weight of the head.

0489 FAYED, M.F.S. 1983. Development and transfer of improved grain sorghum production technology in Egypt. Pages 635-640 In More food from better technology (Holmes, J.C., and Tahir, W.M., eds.). Rome, Italy: FAO.

A package of recommended practices for cultivation of sorghum in Egypt is described.

0490 GALIBA, M. 1983. Development strategy for improved sorghum in farmers' fields. (Fr). Bambey, Senegal: Centre National de Recherches Agronomiques. 26 pp. (Document no. 15).

0491 HAMILTON, R.I., RAO, C.H., and REDDY, M.N. 1983. Influence of population densities and fertility levels on yield components in CSH6 and PJ(8)K local sorghum. Andhra Agricultural Journal 30(3): 207-208. 4 ref.

Two cv. of sorghum CSH6 and PJ(8)K local were tested at 2 levels of populations and 2 levels of nitrogen at Hyderabad, India. The study revealed that the grain number, panicle girth and stem girth of CSH6 and grain number and 100-grain weight of local sorghum were significantly associated with grain yield irrespective of population densities and fertility levels. Correlation and path co-efficient analysis are presented for yield and other parameters for both cultivars.

0492 HATFIELD, J.L. 1983. Remote sensing estimators of potential and actual crop yield. Remote Sensing of Environment 13(4): 301-311. 13 ref.

Spectral-reflectance patterns, vegetative indices of infrared/red, were utilized to signal the beginning and ending times for a stress-degree-day summation. The maximum vegetative index (MSS 7/5) corresponded to the beginning of head-emergence in grain sorghum and the boot-stage in wheat. When the vegetative index declined to 0.5 of the maximum, 90% of the reproductive dry matter had been accumulated, delineating the reproductive portion of the growth cycle. In both grain sorghum and wheat, a linear relationship was found between yield and stress-degree-days over the reproductive period defined by the vegetative index. However, in all years, the grain sorghum data did not fit the same linear relationship because of differences in cultural practices. It was found that the maximum vegetative index could be used to define the potential harvestable yield that was encountered during the reproductive stage. A linear relationship was then found between the yield harvested relative to this potential harvestable yield and the summation of the stress-degree-days.

0493 HESLEHURST, M.R. 1983. Effect of population design and planting pattern on yield response of grain sorghum. Field Crops Research 7(3): 213-222. 20 ref.

A range of grain sorghum cultivars were grown under irrigation of various population densities and planting pattern in 3 seasons. High populations were superior or equal to the standard population generally used under irrigation. Whilst cultivar responses varied, no yield depressions were recorded at high population. This superiority of high population varied with season, and was related to variability of pre-anthesis growth. Seasonal conditions favouring rapid pre-anthesis grown resulted in a yield plateau at low populations. In contrast, environments causing slow pre-anthesis growth led to an increasing yield over the entire

population range. Most of the yield differences were associated with differences in grain number. Maximum yield appeared to be the result of rapid canopy closure by high growth rate or by high populations.

0494 KAMBAL, A.E., SAEED, M.A., GABBAR, H.A., ABDULLA, H.A., and SHRESTHA, P. 1983. Studies on the agronomy of sorghum, maize, and millet; and grain legumes; cowpea, faba beans, pigeonpea, groundnut in Yemen Arab Republic: final report for the period Feb 1982-Mar 1983. Taiz, Yemen Arab Republic: Ministry of Agriculture and Fisheries. 131 pp. 11 ref. (Summary:Ar).

0495 OGUNLELA, V.B., and OBILANA, A.T. 1983. Masakwa: the 'Harmattan sorghum' in Nigeria. NOMA 4(1): 4-6.

The cultivation and improvement of Masakwa, a drought and cold-tolerant sorghum in Nigeria is described.

0496 OUATTARA, N. 1983. Survey of the factors lowering the yields at the seed multiplication centre in M'Pesoba [Mali]: research of improvements in cultivation techniques. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 51 pp.

0497 PRASAD, R. 1983. Agronomic manipulation to suit agro-ecological conditions. Pages 445-449 In More food from better technology (Holmes, J.C., and Tahir, W.M., eds.). Rome, Italy: FAO. 29 ref.

Agronomic research conducted under the All India Coordinated Crop Improvement Projects on sorghum and other crops is reviewed.

0498 STELLA, E.C. 1983. Grain sorghum sown and managed with commonsense. (Es). Revista de los CREA 16(103): 118-122.

Data are given on yields of sorghum grown during 1978-1983 at Santa Fe, Argentina. Recommendations are given for yield improvement.

0499 SUDAN:AGRICULTURAL RESEARCH CORPORATION. 1983. Annual report of Kenana Research Station 1969-1970. Kenana, Sudan: Ministry of Agriculture and Irrigation. 163 pp.

Growth and yield of crops including sorghum were studied at 3 population levels and rates of N application. Effect of different rotations and continuous fertilizer application under monocropping of dwarf sorghum is also studied. Herbicides were evaluated for weed control.

0500 THOMPSON, C.A. 1983. Plant populations, row spacings and other cultural practices for sorghum production. Report of Annual Corn and Sorghum Research Conference 38: 37-52. 23 ref.

Super Thick, a new system of sorghum management was developed at Kansas, USA. In this system earlier maturing hybrids of sorghum are planted 2 to 4 weeks later than normal with a grain drill and seeding rates up to 100,000 seeds per acre. The new system is designed to increase yields, decrease soil erosion hazards, compete with weeds and increase the palatability of sorghum residue. It is compared with conventional cultural practices.

0501 VOLKE HALLER, V. 1983. Generation and adoption of new technology in traditional subsistence agriculture [sorghum, Mexico]. (Es). Agrociencia 53: 31-53. 26 ref. (Summary:En).

0502 WHISLER, F.D. 1983.

Sensitivity tests of the crop and management variables in IRRIMOD. IRRI Research Paper Series no. 95. 13 pp. 4 ref.

The rice-based model included parameters for equations that described growth for rice, mungbean, maize and sorghum. The management parameters included spillway or bund height, weight and development stage of plants at transplanting, sowing rate, fertilizing and turnaround period between crops. The model was more sensitive to crop parameters than to management parameters.

0503 WITTMER, G. 1983. Cereal forage crops for ensiling: spring sown maize and sorghum on the Apulian lowland. (It). Informatore Agrario 39(25): 26399-26401, 26405-26406, 26409-26410, 26413-26415.

At Foggia, Italy the effects of plant density, cv. and irrigation on fresh and dry wt. and FU production of forage maize and forage sorghum over a growing period of 95-100 days and on grain yields and FU production of grain maize and sorghum were examined. Forage sorghum produced 12,000 FU/ha. In comparison, grain from grain cv. contained 3000-6000 FU/ha less than forage from forage cv.

Land Preparation and Cultivation

0504 ALLEN, R.R., and HOLLINGSWORTH, L.D. 1983. Limited tillage sorghum on wide beds. Paper, American Society of Agricultural Engineers no. 83-1517. 8 pp. 5 ref.

Four limited tillage methods or furrow irrigated sorghum were evaluated in Southern Great Plains, USA. Glyphosate controlled volunteer sorghum effectively. Energy and time requirements were reduced with limited tillage. Grain yields were not significantly reduced due to limited tillage.

0505 BENATTI, R., FRANCA, G.V., and FREIRE, O. 1983. Effects of depth, plowing schedule and equipment on the yield of annual crops grown in a red-yellow podzolic soil, ortho. (Pt). Engenharia Agricola 5: 15-20. 10 ref. (Summary:En).

Sorghum and other crops were sown with mould board and disk ploughs to the depths of 0.10 m and 0.30 m in two schedules in a red-yellow podzolic soil in Brazil. The statistical analysis of the yields indicated that the best system of soil preparation for sorghum was once-over shallow disc ploughing.

0506 BOQUET, D.J., and WALKER, D.M. 1983. Cultural responses of grain sorghum. Louisiana Agriculture 26(2): 16-17.

Inconsistencies in the yield response of grain sorghum to row spacing were due to interactions with sowing date and yr. Average sorghum yields in the 10- and 20-in row spacings were 11% and 6% higher, resp., than those in 40-in spacing. The optimum sowing date was mid to late April. Yield response to applied N was greatest with 10-in spacings.

0507 COSTES, J.L., BODET, J.M., and JACQUIN, C.I. 1983. Grain sorghum: everything depends on sowing. (Fr). Producteur Agricole Francais 59(326): 33-34.

0508 DESAI, M.S., DESAI, K.B., and KUKADIA, M.U. 1983. Effect of population density on grain yield of sorghum. Sorghum Newsletter 26: 39-40.

Plant population recorded at the

time of harvesting was highly significant and correlated with grain yield indicating that optimum plant population gives higher yield.

0509 FERRIS, I.G., HOLLAND, J.F., and FELTON, W.L. 1983. Effect of tillage and herbicides on carbon cycling. Pages 64-73 In No-tillage crop production in northern New South Wales: proceedings of the Project Team Meeting, 4 May 1983, Tamworth, New South Wales, Australia (Martin, R.J., and Felton, W.L., eds.). Tamworth, New South Wales, Australia: Department of Agriculture. 11 ref.

Results obtained over a two yr. period indicated that the no-tillage glyphosate and atrazine treatments increased sorghum yield and improved carbon economy in soil in comparison with a mechanically cultivated treatment.

0510 FOREMAN, J.W., BATH, S., and DANIELS, J. 1983. Grain sorghum planting guide: Central Queensland 1982-83. Queensland Agricultural Journal 109(1): 28-30.

Recommended grain sorghum hybrids for planting in Central Queensland are listed. They were selected for their yield, consistency of yield over time, standability and head type.

0511 GALIBA, M. 1983. Plant population in some farmers sorghum fields. Sorghum Newsletter 26: 42.

The change in some traditional practices by the introduction of improved cultivars in Thailand are described. To achieve better yields plant population was increased to 125,000 plants/ha, with a spacing of 80 x 20 cm and 2 plants in a hole. With 40,000 plants/ha the local gave 464 kg.

0512 GROSS, R.U., FRANCIS, C.A., PAVLISH, L.A., NELSON, L.A., and ZWEIFEL, T.R. 1983. Genotype by tilage system interactions in sorghum. Sorghum Newsletter 26: 69.

Average plant emergence was 11% in early zero tillage, 30% in late zero tillage, and 61% in normal clean tillage. It appears that substantial differences exist between ability to germinate and emerge in the two tillage systems, and that differential genotypic reactions to the conditions of the systems exist for some hybrids. Average yields for the systems were 400 kg/ha in early zero tillage, 862 kg/ha in late zero tillage, and 2,060 kg/ha in clean tillage.

0513 HENZELL, R.G., BOURNE, J.F., DELANEY, N.E., and HARBISON, J. 1983. South Queensland grain sorghum planting guide: 1983-84 season. Queensland Agricultural Journal 109(5): 269-271.

Hybrids are recommended on the basis of yield performance and lodging resistance. The lodging, maturity, disease reaction, head type characters are listed. Planting rates are recommended.

0514 HENZELL, R.G., FLETCHER, D.S., and VAN SLOBBE, L. 1983. Guide to grain sorghum characteristics: South Queensland, 1983-84. Queensland Agricultural Journal 109(5): 271-272.

Lodging, maturity, disease reaction, and head type characters of the recommended hybrids are tabulated.

0515 HOLLAND, J.F., and FELTON, W.L. 1983. Response of summer crops to no-tillage. Pages 81-89 In No-tillage crop production in northern New South Wales: proceedings of the Project Team Meeting, 4 May 1983, Tamworth, New South Wales, Australia (Martin,

R.J., and Felton, W.L., eds.). Tamworth, New South Wales, Australia: Department of Agriculture. 1 ref.

The experiments were conducted on sorghum and soybeans on no-tillage sites on no-tillage fallow, cultivated fallow with the stubble retained or the stubble burnt treatments. Sorghum showed consistent yield response to the no-tillage method. Sorghum could be grown in an area which traditionally supports a wheat monoculture system.

0516 LOUVEL, D. 1983. Effect of first weeding-thinning in some farmers fields. Sorghum Newsletter 26: 63.

Observations in farmers fields under 3 levels of fertilizer showed that the first weeding-thinning increases yields of improved lines. If weeding-thinning is delayed, yields decrease.

0517 MAMEDE, F.B.F., CARMO, C.M. DO, and ALVES, J.F. 1983. Effects of the population density on the production of grain sorghum, Sorghum bicolor (L.) Moench. (Pt). Ciencia Agronomica 14(1-2): 37-46. 15 ref. (Summary:En).

Eight plant population densities of grain sorghum ranging from 66.500 to 400.000 plants per hectare, with two inter-row spacings and 4 population densities per meter row length with in each spacing were evaluated at two locations in Brazil. The results indicated that higher yields could be obtained with a population density of 66.500 plants per hectare or an inter-row spacing of 0,75 m and 5 plant per row length within the row.

0518 MAO, M.A. 1983. Studies on row spacing and planting pattern of dryland sorghum under different fertility levels. Pages 653-657 In More food from better technology (Holmes, J.C., and Tahir, W.M., eds.). Rome, Italy: FAO. 3 ref.

Grain yields were not significantly affected by row spacing but increased as the row: plant spacing ratio and levels of N increased. Harvest index was higher in wide rows and decreased with increasing ratio of row: plant spacing.

0519 PALANIVEL, S., and RAMANATHAN, K.M. 1983. Effects of mulch on sorghum yields. Sorghum Newsletter 26: 52-53.

The greatest increases in sorghum dry-matter yield and grain yields occurred when sugarcane trash was applied. Pearl millet straw and maize straw mulches produced equal yields, and were higher than the control plots, but lower than plots with sugarcane trash. The yield increases were associated with improved moisture availability to the crop from mulching.

0520 PALMER, J.C., and JACKSON, L.M. 1983. Summary of activities on category I tillage demonstration sites. 1. Bellata. Pages 170-177 In No-tillage crop production in northern New South Wales: proceedings of the Project Team Meeting, 4 May 1983, Tamworth, New South Wales, Australia (Martin, R.J., and Felton, W.L., eds.). Tamworth, New South Wales, Australia: Department of Agriculture.

Comparative costs from wheat harvests 1982 to sorghum sowing 1983 and details of site treatments are given. For erosion control, no-tillage was found superior to other systems.

0521 STEWART, B.A. 1983. Automated seeding rate selector. Agronomy Journal 75(1): 152-153. 1

ref.

A device for changing seeding rates during planting operations was designed and tested. The device allows for 3 or more seeding rates. The rate is changed by dialing an electric switch which engages the respective electromagnetic clutches. There is no need to stop or slow the planter to make the desired change. The equipment reduces plant densities down the field to correspond with decreased amounts of irrigation water and could be used for better plant population studies. The concept could also be used to change fertilizer or pesticide rates when the materials are applied by chain- or belt-driven assemblies. The device could be constructed at moderate cost.

0522 STINNER, B.R., HOYT, G.D., and TODD, R. 1983. Changes in soil chemical properties following a 12-year fallow: a 2-year comparison of conventional tillage and no-tillage agroecosystems. Soil and Tillage research 3(3): 277-290. 29 ref.

Soil nutrient availability was related to chemical concentrations in the soil solution, plant nutrient uptake and litter decomposition. Soil nitrate concentrations were highest in plowed systems and lowest in the old field. Extractable cation concentrations were generally higher in conventional tillage than in no-tillage soil during the 1st year after fallow. However, during the 2nd year, higher cation concentrations in no-tillage soil prevailed. Nitrate concentrations in the soil solution at 60 cm depth were generally highest in conventional tillage, followed by no-tillage and lowest in old-field systems. Total nutrient uptake by grain sorghum and rye and weeds was higher in conventional than in no-tillage systems. Higher nitrate concentrations in leachate of conventional than in no-tillage and old-field systems suggested that plowing stimulated nitrification processes.

0523 STINNER, B.R., ODUM, E.P., and CROSSLEY, D.A. 1983. Nutrient uptake by vegetation in relation to other ecosystem processes in conventional tillage, no-tillage and old-field systems. Agriculture, Ecosystems and Environment 10(1): 1-13.

Nutrient accumulation, overall, decreased in both cropping systems. Sorghum grain yields were significantly greater in no-tillage systems. Nutrient accumulation by sorghum in the old-field system was, for most elements approximately twice that of conventional and no-tillage systems. No-tillage systems retained some of the nutrient conservation mechanisms thought to exist in natural or less disturbed ecosystems.

0524 UMRANI, N.K., PATIL, C.B., and CHAVAN, K.B. 1983. Effect of soil depth on winter sorghum yields. Sorghum Newsletter 26: 61-62.

An increase in the soil depth, increased grain and fodder yield/ha by 125%, 583% in grain and 34% and 190% in fodder on the medium and deep soils, respectively.

0525 UNDERSANDER, D.J., and MAREK, T.H. 1983. Tillage under center pivot systems on clay soils. Paper, American Society of Agricultural Engineers no. 83-2023. 7 pp.

The effect of different tillage treatments on sorghum and maize yield under 2 pairs of centre pivot irrigation systems over 3 yr. was studied. None of the tillage

treatments had a significant effect on crop yield. There was no appreciable runoff.

0526 VECCHIETTINI, M., and GARAGNANI, E. 1983. Observations on sowing methods. (It). Informatore Agrario 39(13): 25207-25208. 2 ref.

Sorghum was sown using a precision drill (a) or a conventional drill (b) at 15.5 kg seed/ha on 20 April at Modena, Italy in 1982. No. of plants/sq m was higher in (a) than in (b) by 18 May. Grain and stover yields were unaffected by sowing methods.

0527 VITTAL, K.P.R., VIJAYALAKSHMI, K., and RAO, U.M.B. 1983. Effect of deep tillage on dryland crop production in red soils of India. Soil and Tillage Research 3(4): 377-384.

The advantage of deep tillage to crop yields was found to be dependent on rainfall pattern and plant type. In a normal rainfall season the yield advantage was observed for both short duration sorghum and pearl millet and long duration crops, while the advantage in an above-normal rainfall season was restricted to long duration crops only. No yield advantage was noticed in a sub-normal rainfall year for any of the crops. The residual effects of deep tillage were marginal. Deep tillage was beneficial in 63 and 91% of years for short and long duration crops, respectively. Adoption of deep tillage every year in traditional castor-sorghum rotation resulted in benefits in 56% of years for both the crops. Since deep tillage requires a high monetary input, it is suggested to adopt this practice only for castor.

Fertilizers and Plant Nutrients

0528 ADINARAYANA, S. 1983. Economics of fertiliser use on paddy and sorghum. Fertiliser Marketing News 14(10): 1-5.

0529 BASAVARAJU, C.V., and BOMMEGOWDA, A. 1983. Effect of nitrogen levels, methods of N application and spacings on the hybrid seed yield and quality of sorghum (CSH-6). Indian Journal of Agronomy 27(4): 468-471. 2 ref.

Four levels of N, 2 methods of N application and 2 spacings were tested in 16 treatment combinations in a randomized block at Agricultural College, Bangalore, India. Increase in N levels increased the grain yield and hastened flowering by 15 days. Soil and foliar application of N and wider spacing increased the yield. The post-harvest hybrid seed quality characters also increased with increase in N levels to the seed parent.

0530 BISHNOI, S.R., BRAR, S.P.S., and SINGH, B. 1983. Apply phosphorus to sorghum. Progressive Farming 19(10): 11, 13.

Phosphorus application not only increased the fodder yield but it also improved the nutritional value of the fodder.

0531 BRAGA, J.M. 1983. Effect of liming and phosphorus fertilization on crop response to zinc. 1. Sorghum. (Pt). Revista Ceres 30(170): 285-294. 18 ref. (Summary:En).

The experiment was carried out in the greenhouse at 3 levels of Zn, one of P, 2 of lime, and with two varieties of sorghum. The sorghum variety more tolerant to low levels of phosphorus produced more dry

matter and absorbeb more Zn even when a high level of P was applied to the soil. Zn limited the dry matter production of sorghum in soils where limestone was applied. The P and Zn levels in soils were the lowest (after harvesting) when lime was applied.

0532 CAMBRAIA, J., GALVANI, F.R., ESTEVAO, M.M., and SANT'ANNA, R. 1983. Effects of aluminium on organic acid, sugar and amino acid composition of the root system of sorghum (Sorghum bicolor L. Moench). Journal of Plant Nutrition 6(4): 313-322. 21 ref.

The effects of Al on the accumulation of sugars, amino acids and organic acids in 2 hybrid cv. of sorghum were studied in Brazil. The concentration of these organic compounds increased in the roots of the Al-treated plants, mainly in the tolerant cv. The composition of the organic acid fraction showed a significantly higher accumulation of trans-aconitate and malate in the tolerant cv. as compared with the sensitive one. The higher levels of these acids in the Al-treated plants could be interpreted as being indicative of a chelating detoxifying mechanism of Al in these plants.

0533 CAMBRAIA, J., LEMOS FILHO, J.P. DE, ESTEVAO, M. DE M., and OLIVA, M.A. 1983. Effect of aluminium on the contents of Mg, Fe, Mn and Cu in sorghum. (Pt). Revista Ceres 20(167): 45-54. 20 ref. (Summary:En).

0534 CAMBRAIA, J., LEMOS FILHO, J.P. DE, OLIVA, M.A., and ESTEVAO, M. DE M. 1983. Effect of aluminium on the photosynthesis in two sorghum cultivars. (Pt). Revista Ceres 20(167): 55-62. 22 ref. (Summary:En).

0535 DAFTARDAR, S.Y., RATHOD, R.K., JOSHI, V.A., HAJARO, D.B., and KILLEDAR, N.S. 1983. Effect of Azotobacter alone and in combination with different doses of nitrogen on the yield of winter sorghum. Sorghum Newsletter 26: 62.

Results indicated that grain yields of sorghum when Azotobacter was used alone, were similar to those when 25 N/ha was applied. Grain yields increased even more with 25 kg N/ha plus Azotobacter, but were below 50 kg/N/ha.

0536 DESAI, K.B., PANDYA, R.K., DESAI, D.T., and PATEL, R.H. 1983. Biological fertilization with Azospirillum brasilense in sorghum. Sorghum Newsletter 26: 55. 1 ref.

An experiment was conducted to assess the effectiveness of Azospirillum brasilense alone and in combination with different levels of N on sorghum productivity. 80 kg N/ha gave the highest grain yields. Applications of Azospirillum brasilense alone or in combination with 20 kg N/ha or 40 kg N/ha did not give increased grain yields over those of the control.

0537 DHONDE, P.W., and NAGARKAR, K.G. 1983. Comparative performance of rabi sorghum entries to graded levels of nitrogen. Sorghum Newsletter 26: 57.

Yields of the sorghum entries increased with successive increases in the level of N. Results indicated that the cultivation of the sorghum hybrid CSH-8R under rainfed conditions benefited from the 90 kg N/ha.

0538 DHONDE, P.W., and RELEKAR, M.M. 1983. Response of kharif sorghum entries to varied levels of nitrogen. Sorghum Newsletter 26: 57.

To obtain maximum responses of

sorghum to N, the popular hybrid CSH-5 should be grown in kharif season with 90 kg N/ha under rainfed conditions.

0539 DHONDE, P.W., PATIL, B.B., and PAWAR, A.D. 1983. Effect of soil moisture and varied levels of nitrogen on grain yields of kharif sorghum. Sorghum Newsletter 26: 58.

It was found that grain yields of sorghum increased with successive increases in the level of N up to 100 kg/ha. However, the yield differences between 100 and 150 kg N/ha were not significant. Application of water at 50% available soil moisture at each N level showed better performance than other irrigation treatments.

0540 DIALLO, M.C. 1983. Survey on the nitrogenous fertilization of sorghum in relation to the contribution of molybdenum [Mali]. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 33 pp.

0541 DUNCAN, R.R., CLARY, R.B., and FURLANI, P.R. 1983. Laboratory and field evaluations of sorghum for response to aluminium and acid soil. Agronomy Journal 75(6): 1023-1026. 28 ref.

The objectives of this study were to determine genotypic differences and to better quantify Al and acid soil tolerance screening techniques. Among the genotypes studied, SC0283 was the most tolerant to acid soil field stress conditions and was also the least affected by Al toxicity conditions in nutrient solutions. NB9040 was susceptible to acid soil field conditions, exhibited considerable tolerance to medium levels of solution Al, and was susceptible to high levels of solution Al. Tolerance or susceptibility to Al among the sorghum genotypes was influenced by the level of the acid soil stress condition. Genotype responses to Al-induced stress conducted in the laboratory and to acid soil stress conducted in the field showed similar responses when the screening parameters for each environment were quantified.

0542 EPPENCLORFER, W.H., BILLE, S.W., and PAIBOON PRABUDDHAM. 1983. Fertilizer (NPK) and water stress effects on yield, mineral composition, protein production and protein quality of tropical food crops [rice, maize, sorghum, mungbeans and peanuts in Thailand]. Bangkok, Thailand: Asian Institute of Technology. 87 pp. 52 ref. (AIT Research Report no. 157).

0543 FOURCASSIE, F. 1983. Grain sorghum fertilizer in the Lauragais soils. (Fr). Producteur Agricole Francais 59(326): 31-32.

0544 FREIRE, F.M., BRAGA, J.M., and MARTINS FILHO, C.A.S. 1983. Fertilizing efficiency of soluble phosphates, natural and partially acidulated, under greenhouse conditions. (Pt). Revista Brasileira de Ciencia do Solo 7(1): 65-68. 17 ref. (Summary:En).

A greenhouse study was carried out to compare the agronomic efficiency of several P sources on growth of sorghum. Phosphate rock partially acidulated, natural rock phosphates as well as soluble P sources were applied to soil materials of 2 Red-Yellow Latosol soils of Brazil, at the rates of 0, 50, 100, 200, 400, 800 and 1,600 ppm P. The rock phosphates showed a lower agronomic efficiency when compared to other P soluble sources, while both superaude and ordinary superphosphate were equivalent to the triple superphosphate when applied to soil. The partially acidulated

rock phosphate when compared to soluble and natural P sources showed intermediate effect.

0545 GANRY, F. 1983. Nitrogen sources and management in arid tropics. (Fr). Bambey, Senegal: Centre National de Recherches Agronomiques. 15 pp. (Document no. 41/83).

0546 GOMES, M.M. DE S. 1983. Effect of aluminium on the composition of the nitrogenous fraction and on the nitrogen transport forms in two sorghum cultivars. (Pt). M.S. thesis, Universidade Federal de Vicosa, Vicosa, MG, Brazil. 41 pp. 50 ref.

0547 GUPTA, V.K. 1983. Studies of the comparative response of some kharif crops to zinc application. Agricultural Science Digest (India) 3(2): 79-80. 2 ref.

Results on comparative response of kharif crops to Zn revealed that green gram and black gram were highly responsive to Zn. Sorghum, soybean and ladyfinger were less responsive than green gram and black gram.

0548 HERBERT, R.F. 1983. Kraal manure. Bulletin of Agricultural Research in Botswana 1: 10-19. 11 ref.

The composition, production and use of farmyard manure and the response of crops including sorghum to these manures in Botswana are discussed.

0549 HORROCKS, R.D., and YANG, A.Y.J. 1983. Soil temperature affects element uptake by sorghum. Journal of Plant Nutrition 6(8): 679-697. 29 ref.

Plants were grown in 20-liter containers at cooled and ambient soil temperatures of 20 and 25 deg C, respectively, and were harvested at the 8- and 12-leaf stages of development for yield and nutrient analysis. At the 8-leaf stage, sorghum plants subjected to 25 deg C were significantly higher in concentration of N, P, K, Mg, and Cu, but were significantly lower in Ca. Soil temperature did not significantly affect concentration of Zn, Fe, and Mn. At the 12-leaf stage, sorghum plants grown in the warm soil temperature treatment were lower in concentration of N, K, Ca, Mg, Zn, Fe, Mn and Cu than plants grown in the cooled-soil treatment. Phosphorus showed a negative response to increased temperature.

0550 JACKSON, T.L., HALVORSON, A.D., and TUCKER, B.B. 1983. Soil fertility in dryland agriculture. Pages 297-332 In Dryland agriculture (Dregne, H.E., and Willis, W.O., eds.). Madison, Wisconsin, USA: American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America. 132 ref.

Nutrient requirements of wheat, oil crops, sorghum, corn, legumes, grasses, cotton and cropping systems are reviewed.

0551 JADHAV, D.K., GHONSIKAR, C.P., and TATTU, R.K. 1983. Phosphate use efficiency in grain sorghum cultivars. Madras Agricultural Journal 70(6): 388-392. 8 ref.

A field experiment with 5 sorghum cv. was conducted to study the phosphate use efficiency in sorghum. Per cent P derived from fertilizer was increased with increasing levels of P at all the stages of growth. The per cent P removal by plant was low at second sampling. The genotypic ability for utilization of applied fertilizer P differed greatly. Significantly high P uptake in all the sorghum cultivars was observed

at 90 kg P205/ha. Even with applied fertilizer phosphate, sorghum crop absorbed nearly 92 per cent of its total P uptake from native soil P source.

0552 JONES, C.A. 1983. A survey of the variability in tissue nitrogen and phosphorus concentrations in maize and grain sorghum. Field Crops Research 6: 133-147. 62 ref.

A literature survey was conducted to determine the variability of tissue N and P concentrations in maize and grain sorghum shoots, roots, grain, and residues. Tissue N and P concentrations associated with near-optimum yields, the ratio of shoot N to shoot P, the relationship between harvest indexes for N and dry matter, and the relationship between shoot N concentration and grain N concentration were also investigated. Maize and grain sorghum root N concentrations were less variable than shoot N concentrations and were not strongly dependent on growth stage. Grain and residue N and P concentrations were variable.

0553 JOSHI, P.K., and DHONDE, P.W. 1983. Studies on the response of rainfed sorghum to nitrogen, phosphorus, and potassium. Sorghum Newsletter 26: 55.

Grain yields of sorghum increased with increasing levels of N and P. The response of sorghum to K, was relatively less significant. The N X P interaction indicated that 120 kg N/ha and 40 kg P205/ha to be the optimum dose for sorghum grain production during the kharif. the N X P X K interaction was not significant.

0554 KALYANKAR, S.P., and ALI, M.A. 1983. Economic optima and physical maxima of fertilizer use in CSH-1 seed production. Sorghum Newsletter 26: 56.

The economic optima was obtained from Rs. 325/q of CSH-1 sorghum grain and Rs. 3.57 per kg N. The maxima of fertilizer use for N, P205 and K20 for highest yields were 38, 37, and 36 q, respectively, for 120 kg N, 55 kg P205 and 45 kg K20.

0555 KALYANKAR, S.P., and ALI, M.S. 1983. Fertilizer use efficiency in CSH-1 seed production in Maharashtra State. Sorghum Newsletter 26: 57.

The study indicated that grain production increased linearly with an increase in N, P, and K.

0556 KANWAR, J.S., and REGO, T.J. 1983. Fertilizer use and watershed management in rainfed areas for increasing crop production. Fertiliser News 28(9): 33-43. 15 ref.

Results of experiments using watershed management technology, high yielding varieties of sorghum, groundnut, pearl millet, etc. grown as sole crop, intercrop or companion crop, and split dose application of N fertilizers in Vertisols and Alfisols are reported.

0557 KIRKHAM, M.B. 1983. Element content of soil, sorghum and wheat on sludge-injected agricultural land. Agriculture, Ecosystems and Environment 9(3): 281-292. 25 ref.

Soil and two crops, sorghum and winter wheat were sampled after sludge had been added to the soil. The control area received only inorganic fertilizer. Soil in sludge-fertilized fields had more N, P, K, Mg, Fe, Cu, Mn, Zn, Cd, Cr and Ni than did soil from the control fields. In general, concentrations of essential and N

on essential elements in plants grown on sludge were similar to concentrations in plants grown with inorganic fertilizer. The sludge-treated plants had a higher concentration of the element than did the control plants: Cd in stems of sorghum; Cr in roots of wheat; Ni in roots and grain of wheat; and Pb in roots of wheat. Cadmium was at low levels in all plants, which indicated that, when sludge was layered below the surface of the soil, transfer of Cd from the soil to the plants was small. Sludge-injection appeared to be an effective method for fertilizing plants.

0558 LEHLE, F.R., FRANS, R., and MCCLELLAND, M. 1983. Allelopathic potential of Hope white lupine (Lupinus albus) herbage and herbage extracts. Weed Science 31(4): 513-519. 17 ref.

Johnsongrass fresh weight was significantly stimulated at most rates of incorporated lupine over 500 ppm. Extracts prepared from lupine herbage were inhibitory to sorghum coleoptile and root growth at extract concentrations above ca. 130 mg dry herbage weight extracted per ml of water. In contrast to the stimulatory responses with soil incorporated Hope white lupin herbage, herbage extracts was not stimulatory to the germination and growth of sorghum at the concentrations tested.

0559 LETZSCH, W.S., and SUMNER, M.E. 1983. Computer program for calculating DRIS indices. Communications in Soil Science and Plant Analysis 14(9): 811-815. 16 ref.

Attention is drawn to the availability of packaged computer programs for calculating nutrient indices for the DRIS (Diagnosis and Recommendation Integrated System) approach to diagnosing nutrient insufficiencies, excesses and imbalances in plant tissue. A brief outline of the subroutines is given together with details of how to obtain and use the programs. Sorghum is one of the crops covered.

0560 LYTTON, D.L., and MCCASLIN, B.D. 1983. Interactions of gamma-irradiated sewage, nitrogen and phosphorus for sorghum on a calcareous soil. Communications in Soil Science and Plant Analysis 14(12): 1235-1251. 19 ref.

The phosphorus and sludge treatments were applied to 3 crops of sorghum grown in the greenhouse at the initiation of the experiment and N was applied to the corresponding nitrogen treatment pots before each of the 3 croppings. There was a significant nitrogen x sewage interaction for dry matter production, P concentration and P uptake in each harvest. There was a significant P sewage sludge interaction in the first harvest for P uptake. All other possible interactions were not statistically significant. The 67 metric ton/ha sludge rate produced nearly the same yield as the N treatment. In the first harvest, sludge significantly increased plant P uptake from the fertilizer P. The P uptake in sorghum from 472 and 944 kg P/ha from the sludge treatments was comparable to that from 1299 and 2598 kg P/ha from triple superphosphate.

0561 MARTIN, G.W., and TOUCHTON, J.T. 1983. The effects of winter crop use on subsequent grain sorghum yields. Sorghum Newsletter 26: 63-64.

Data indicates that crimson clover can provide sufficient N to allow for maximum grain sorghum yields, if the forage is not grazed or removed as hay. Under a grazing

regime, arrowleaf clover was a superior green manure crop for grain sorghum. Grazing or haying rye reduced the N requirements for grain sorghum, but did not provide maximum yield when recommended rates of N were applied.

0562 MATHUR, O.P., MATHUR, S.K., and TALATI, N.R. 1983. Effect of addition of sand and gypsum to fine-textured salt-affected soils on the yield of cotton and jowar (sorghum) under Rajasthan Canal Command Area conditions. Plant and Soil 74(1): 61-65. 4 ref.

Application of sand was found to be quite effective in enhancing the leaching of salts from the soil profile due to increased infiltration and moisture conservation. Sand covers of 5 and 10 cm thickness significantly increased the yield of seed cotton and subsequently hybrid sorghum taken on the same plots as compared to control. Gypsum did not increase the yields significantly. Ploughing of sand was found to be beneficial to increase crop yields.

0563 MOHITE, K.R., RATHI, L.G., and PURANIK, R.B. 1983. Effect of lime with copper and boron on grain yield and NPK uptake by hybrid jowar (CSH-1). PKV Research Journal 7(1): 48-49. 4 ref.

The grain yield and NPK uptake were adversely affected by higher levels of $CaCO_3$ alone or in combination with increasing doses of Cu + B which could be due to reduction in availability of plant nutrients.

0564 MORITSUGU, M., SUZUKI, T., and KAWASAKI, T. 1983. Effect of nitrogen source on growth and mineral uptake in plants under constant pH and conventional culture conditions. Berichte des Ohara Instituts fuer Landwirtschaftliche Biologie, Okayama Universitat 18(3): 125-144. 60 ref.

Thirteen plant species including sorghum were grown by the constant pH and the conventional culture methods. Sorghum showed high resistance to ammonium ion and low resistance to hydrogen ion. Ammonium ion tended to depress cation uptake while nitrate ion tended to depress PO_4 uptake. But these effects were less marked at constant pH. Mn uptake and Zn uptake were slightly inhibited by ammonium ion at constant pH.

0565 MUTHIAH, N.D., and RAMANATHAN, G. 1983. Studies on nutrient uptake by different varieties of sorghum at varying levels of N and P. Madras Agricultural Journal 70(10): 647-649. 9 ref.

Field experiments were conducted with 5 different sorghum varieties viz., CO 18, CSH 5, CSH 6, CSV 4 and composite IX with graded levels of N and P. Potassium application was common. Uptake of N was the highest at maturity stage and lowest at seedling stage. Uptake of N was more with increasing levels of N. Varietal variation with regard to N uptake was also seen. Nitrogen had a favourable effect on P uptake. The variety CSH 6 recorded highest P uptake. Uptake values of K showed similar trend of results as in the case of N and P.

0566 MUTHIAH, N.D., and RAMANATHAN, G. 1983. Studies on yield capability of different sorghum varieties at varying levels of N and P. Madras Agricultural Journal 70(10): 665-669. 11 ref. [Also published in condensed form in Madras Agricultural Journal 70(11): 769-770. 1983].

Field experiments were laid out with 5 different sorghum varieties namely CO 18, CSH 5, CSH 6, CSV 4, and Composite IX with graded levels of N and P (i.e.) 0, 60, and 120 kg/ha. Potash application was common. The variety CSH 6 significantly yielded higher grain whereas straw yield by CSH 5. N levels caused significant differences in grain yield but not P levels. But NP interaction proved beneficial as for as straw yield is concerned. Higher grain/N ratio was recorded in CSH 6 which was the most responsive variety among the six varieties tried.

0567 MYERS, R.J.K. 1983. Effect of plant residues on plant uptake and leaching of soil and fertilizer nitrogen in a tropical red earth soil. Fertilizer Research 4(3): 249-260. 29 ref.

Two field experiments, in which differing amounts and types of plant residues were incorporated into a red earth soil, were conducted at Katherine, Australia. The effect of the residues on uptake of soil and fertilizer N by a subsequent sorghum crop, on the accumulation and leaching of nitrate, and on losses of N was evaluated. Stubble of grain sorghum applied at an exceptionally high rate (18999 kg/ha) reduced uptake of N by sorghum by 13% and depressed the accumulation of nitrate under a crop and particularly under a fallow. Loss of fertilizer N, movement of nitrate down the profile, and uptake by the crop was studied in another experiment after application of N as 15 NH4, 15N03 to field microplots. By four weeks after fertilizer application 14% had been lost from the soil-plant system and by crop maturity 36% had been lost. The pattern of 15N distribution in the profile suggested that losses below 150 cm had occurred during crop growth. The recovery of 15N by the crop alone ranged from 16 to 32%. There was an apparent loss of N from the crop between anthesis and maturity.

0568 NAGRE, K.T. 1983. Response of rainfed sorghum to split application of P and K. Journal of Maharashtra Agricultural Universities 7(3): 233-234. 5 ref.

Results of the experiment conducted at Maharashtra, India for three years indicated that sorghum hybrid CSH-1 responded to phosphate and potash application. Application of 60 kg P205/ha recorded significant increase in grain yield over no phosphate with a mean response of 752 kg/ha. Sorghum responded more to P than to K. In low rainfall year there was less response to P and K than in high rainfall year. Response of sorghum to per kg of P applied was 12.5 kg whereas it was 6.5 kg/kg of K. Under rainfed conditions single application of phosphate and potash at sowing was found better than split application.

0569 NAIK, L.B. 1983. Studies on the pattern of dry matter accumulation and distribution in sorghum genotypes as influenced by nitrogen levels. Madras Agricultural Journal 70(8): 548-551. 5 ref.

The experiment was conducted on 3 sorghum genotypes on black clay loam soil at Karnataka, India with 4 N treatments. The total dry matter production increased with the increase in the N levels. The hybrid CSH-5 was more efficient as compared to the other genotypes in the utilization of n and the accumulation of higher amount of dry matter in the ear which is related to yield.

0570 NNADI, L.A., and ABED, S.M. 1983. Evaluation of sulphur-coated urea fertilizers in

savannah soils. 1. Response of cotton and sorghum. Journal of Agricultural Science (UK) 101(1): 119-123. 14 ref.

Two sources of sulphur-coated urea (SCU) were compared with calcium ammonium nitrate (CAN) as sources of N for cotton and sorghum in the savannah zone of Nigeria. At the lowest rate of N application 40 kg/ha for sorghum, SCU-11 with a dissolution rate of 11% in 7 days was found to be more effective than SCU-30 having a dissolution rate of 30% in 7 days and CAN. A single application of SCU-11 produced a higher sorghum yield than a divided application of CAN at the same rate. The results indicate that a slow-release N fertilizer might be useful for improved grain sorghum varieties.

0571 NNADI, L.A., and ABED, S.M. 1983. Evaluation of sulphur-coated urea fertilizers in savannah soils. 2. Effects on soil pH and residual nitrogen. Journal of Agricultural Science (UK) 101(1): 125-129. 12 ref.

The residual effects of sulphur-coated urea (SCU) fertilizers were evaluated by measuring the pH and mineral-N in the soil profile after 2 years of application of these fertilizers to sorghum fields of the savannah of Nigeria. Changes of 0.2-0.3 pH units relative to the control (without applied N) were detected on the sandier soils at Kadawa and Mokwa but not on the heavier Samaru soils. There was little or no difference among the sulphur-coated urea and calcium ammonium nitrate in their acidification effects. Also residual nitrogen levels were low in plots that received SCU but did not differ significantly from those of calcium ammonium nitrate.

0572 OLSEN, S.R., WATANABE, F.S., and BOWMAN, R.A. 1983. Evaluation of fertilizer phosphate residues by plant [sorghum, sudangrass, and barley] uptake and extractable phosphorus. Soil Science Society of America Journal 47(5): 952-958. 16 ref.

Residual phosphate from fertilizer P or manure seemed to accumulate mainly as octocalcium phosphate (OCP) in 23 alkaline and calcareous soils of Colorado, USA. Soil solution composition data were corrected for six ion pairs in calculating the calcium phosphate potential. These soils contained 37 to 162 mg/kg $NaHCO_3$-soluble P. Phosphorus removed by cropping varied between 58 and 275 mg/kg with five to eight crops before P deficiency reappeared. P uptake was highly correlated with available P before cropping as measured by $NaHCO_3$-soluble P resin-extractable P, and labile P by 32P isotopic dilution. Plants absorbed more P at equal initial concentrations of soluble P (in 0.01M $CaCl_2$) from soils containing higher clay contents. All the OCP dissolved during cropping. Accumulation of fertilizer P residues in this form would appear to be beneficial since this P is potentially all available to crops. Therefore, methods for estimating the amount of OCP in soils should be useful.

0573 PADALIA, M.M., KANZARIA, M.V., and PATEL, C.L. 1983. Correlation studies of potassium extracted by different extractants with yield and uptake of potassium by hybrid jowar in calcareous soil. Gujarat Agricultural University Research Journal 9(1): 71-73. 5 ref.

Field and pot-culture studies were conducted to evaluate the best method of k extraction for highly calcareous medium black soils of Gujarat. Under pot culture conditions all the methods of k

extraction gave highly significant correlation with dry matter and uptake of k. The best correlation was shown by the Morgan's extractant with grain yield and uptake of k at 1% level and with fodder yield at 5% level.

0574 PAL, U.R., SINGH, V.P., SINGH, R., and VERMA, S.S. 1983. Growth rate, yield and nitrogen uptake response of grain sorghum (Sorghum bicolor (L.) Moench to nitrogen rates in humid subtropics. Fertilizer Research 4(1): 3-12. 6 ref.

Field experiments were conducted on sorghum at Pantnagar, India. In addition to the enhancement in flowering maturity stages brought about by N application, it also resulted in increased plant dry weight, translocation coefficients, grain yield/plant and grain yield/ha. Varietal differences existed with respect to their responses for yield and N uptake to N rates. Most of the entries responded up to 120 kg N/ha. Hybrid CSH-5 utilized applied N more efficiently than other varieties.

0575 PATIL, J.D., and PATIL, N.D. 1983. Iron-manganese relationship in sorghum nutrition as influenced by calcium carbonate and organic matter. Journal of Maharashtra Agricultural Universities 8(2): 190-191. 4 ref.

The soil used for the study was clay loam Vertisol having pH 7.6, available iron 3.65 ppm and manganese 7.5 ppm. 24 treatment combinations were studied. Fe/Mn ratios at seedling, flowering and harvest stages are given. The results indicated that the relationship varied within appreciable limits according to the status of soil for calcium carbonate and organic matter. The iron and manganese content in the growing medium and their ratio in plant tissues provided optimum growth of the plant.

0576 RAJPUT, F.K., ARAIN, A.S., RAJPUT, M.J., and KHAWAJA, K.B. 1983. Effect of row spacing and fertilizer levels on the yield and growth of sorghum. Pakistan Journal of Agricultural Research 4(3): 166-170. 8 ref.

The results of the experiment revealed that the fertilizers significantly affected plant height, earhead length, weight of earhead and grain yield per plot. Row spacings also significantly affected the earhead length, weight of earhead, and grain yield per plot, but no significant effect of row spacings on plant height was observed. The interaction of fertilizers and row spacings showed significant effect on weight of earhead and grain yield per plot, whereas, other yield contributing factors were not influenced significantly.

0577 RICKERL, D.H., and TOUCHTON, J.T. 1983. Planted and ratooned grain sorghum response to starter fertilizer. Sorghum Newsletter 26: 67-68.

With the planted crop, increases of 670 and 2,075 kg/ha yield were obtained with the starter fertilizers in the conventional and no-tillage systems, respectively. The total grain yield response to the starter fertilizer in the conventional and no-tillage system was 1,095 and 2,285 kg/ha, respectively. Grain weights were higher for the ratooned crop than the planted crop.

0578 SINGH, L., and BALASUBRAMANIAN, V. 1983. Crop responses to fertilizers, lime and micronutrients under continuous cultivation in northern Nigeria. Fertilizer Research 4(3): 181-190.

23 ref.

Maize, cotton, sorghum, and groundnuts at Mokwa, Nigeria were grown in rotation with annual dressings of N, K, and lime with or without a foliar spray of trace elements. Response of sorghum to N, K, and lime was not significant and there was no yield response to boron application.

0579 SINGH, S., and SINGH, B. 1983. Response of sorghum cultivars to nitrogen fertilization under rainfed conditions. Indian Journal of Agronomy 28(3): 321-323. 4 ref.

The field experiments were conducted at Kanpur, India during 3 rainy seasons on loam soils. The treatment comprised 5 cultivars in main-plots and 4 nitrogen levels (0, 40, 80 and 120 kg/ha) in sub-plots repeated 4 times in split plot design. Hybrid CSH 5 performed well in all the three years. Nitrogen was found to influence different parameters except grain yield in first, and ears and plant population in all the 3 yrs. Grain yield was maximum at 120 kg N/ha.

0580 SOUZA, L.F.S., FERNANDES, M.S., VELLOSO, A.C.X., and CASTRO, A.F. DE. 1983. Liming and phosphorus fertilization in soils under cerrado. 1. Dry matter accumulation and phosphorus uptake by sorghum. (Pt). Pesquisa Agropecuaria Brasileira 18(7): 715-720. 15 ref. (Summary:En).

Plants were grown in 4 Oxisols originally under cerrado vegetation. Liming per se, had no effects on dry matter accumulation and P-uptake. P application without liming did not increase dry matter accumulation and P-uptake, except for one Oxisol where Al-saturation level was originally low. There was a positive correlation between P-fertilization and liming on dry matter accumulation and P-uptake by plants. The results showed that the main effect of liming in these soils was on the elimination of phytotoxicity due to exchangeable Al ions.

0581 SUBBIAH, S., and RAMANATHAN, K.M. 1983. The effect of sewage sludge and mineral fertilizers on the yield of sorghum and maize and chemical properties of soils. Pages 399-406 In Sixth International Scientific Conference on Problems of an Optimum Nutrient Supply to Tropical Crops, Leipzig, German Democratic Republic. Leipzig, German Democratic Republic: Karl Marx University, Institute of Tropical Agriculture. 7 ref.

Field experiments were conducted on Alfisols and Vertisols with different levels of sludge and fertilizer on yield of sorghum raised as first crop. The application of sludge increased the availability of N, P, K, Mn, Zn, and Cu and reduced the availability of Fe in the soil. Application of sludge and fertilizers increased the yield of sorghum grain and straw. The residual effect also improved the soil properties and yield of maize.

0582 SUBBIAN, P., and IRUTHAYARAJ, M.R. 1983. Phospal as a source of phosphorus in grain sorghum. Sorghum Newsletter 26: 51.

Application of 120 kg P205 as phospal with 120 kg N and 60 kg K20/ha gave maximum grain yield of 6150 kg/ha. With the same dose of N and K20, application of 120 kg P205/ha as a single superphosphate gave a grain yield of 6040 kg/ha. Hence, phospal can substitute for single superphosphate for grain sorghum.

0583 SUMNER, M.E., RENEAU, R.B., JR., SCHULTE, E.E., and AROGUN, J.O. 1983. Foliar diagnostic norms for sorghum. Communications in Soil Science and Plant Analysis 14(9): 817-825. 18 ref.

The Diagnosis and Recommendation Integrated System (DRIS) is found to be an apropriate foliar diagnostic tool for sorghum with respect to N,P,K,Ca and Mg. The norms were developed from a data bank comprising 907 observations of tissue composition and yield gathered from the literature and investigators' files. The total population of observations is divided into a high and low subpopulation on the basis of yield. Those forms of expressing tissue composition which discriminate best between the 2 subpopulations are used to compute DRIS indices which measure the extent of the deviation from the established norm. An independent set of data from 2 field experiments is used to show that the norms can validly diagnose nutrient insufficiencies which when corrected, result in yield increases.

0584 TIKANDE, B.B. 1983. Effect of soil and foliar application of zinc on the yield and uptake of nutrients by sorghum CSH-9. M.Sc. thesis, Punjabrao Krishi Vidyapeeth, Akola, Maharashtra, India. 68 pp.

Soil application of zinc at 10 and 20 kg/ha, significantly increased the grain and fodder yield of sorghum. Foliar application of 1% zinc once was found to be superior than that applied twice and through soil as far as yield was concerned. Application of Zn through soil and foliage resulted in higher concentration and uptake of N and Zn over control. Zn appeared to exert very little influence on concentration of P, K, Ca, Mg, and S in grain. Maximum increase of crude protein was recorded with soil application of 20 kg Zn/ha. Application of Zn was found to have no influence on soluble carbohydrate and 1000-grain weight. Availability of Zn after harvest of crop was found increased slightly by both soil and foliar application of Zn over its status in control.

0585 TOUCHTON, J.T., and HARGROVE, W.L. 1983. Grain sorghum response to starter fertilizers. Better Crops with Plant Food 67: 3-5.

The starter fertilizers increased early plant weight on all soils tested at Alabama and Georgia, USA. On each soil except one, grain yields were increased by the starter fertilizers. The greatest yield response was in the no tillage system to the starter fertilizers.

0586 UMRANI, N.K., and PATIL, C.B. 1983. Fertiliser use efficiency in relation with management in drylands. Fertiliser News 28(4): 33-34. 1 ref.

An operational scale 5 cv. trial on fertilizer use efficiency in relation with management in rabi sorghum was conducted at the Dry Farming Research Station, Solapur, India. It was observed that fertilizer application to rabi sorghum under dryland situations increased the yield significantly. At 25 kg N/ha level, improved management increased the fertilizer use efficiency by 70 per cent over the traditional management system. Improved management consisted of early sowing, adequate plant density and 3 interculture. At this level, profit was worked out as Rs. 7.69/Re invested in fertilizer.

0587 UMRANI, N.K., and PATIL, C.B. 1983. Role of management in nitrogen response to winter sorghum under dryland conditions. Sorghum Newsletter 26: 62.

Study showed that applications of 25 kg N/ha increased sorghum yields by 27% in the grain and 16% in the fodder under local management. When N application is accompanied with improved management, increases of 85% in grain and 43% in fodder was observed indicating response to N was better when management was improved.

0588 UMRANI, N.K., and PATIL, N.D. 1983. Advances in fertiliser management for rainfed sorghum. Fertiliser News 28(9): 57-61.

The conditions of dryland sorghum cultivation in India are discussed. Increasing the efficiency of N fertilizer use by placement, cropping system and suitable implements and varieties are considered.

0589 VERMA, J.K., and PANDAY, B.B. 1983. Biofertilizers for grain sorghum. Sorghum Newsletter 26: 62-63.

Azospirillum seed dressing enhanced stover production, but did not affect grain production. Days to 50% flowering, grain weights, and 1,000 seed weights were not affected by Azospirillum additions.

0590 VYAS, B.N., and MISTRY, K.B. 1983. Comparative uptake and translocation of plutonium and americium in six plant species. Journal of Nuclear Agriculture and Biology 12(4): 89-92. 23 ref.

Studies on the uptake of 229Pu and 241Am by six plants including sorghum grown in nutrient solution indicated that Pu concentration ratios in shoots were 1-2 orders of magnitude lower than the corresponding Am concentration ratios. The values of transport index for both Pu and Am were, in general, higher in dicotyledonous than in monocotyledonous species.

0591 ZOPI, H., M.C. 1983. Effect of potassium and magnesium in sorghum and maize in a oxisol under tropical dry forest conditions. (Es). Thesis, Universidad Central de Venezuela, Maracay, Venezuela. 86 pp. 64 ref.

Planting Seasons and Dates

0592 BEBAWI, F.F., and ABDELAZIZ, A.H. 1983. Grain sorghum responses to pure stands and mixtures under irrigation. Tropical Agriculture 60(4): 262-264. 8 ref.

The grain yield of pure stands and equi-proportional mixtures of six cv. of sorghum was studied over two crop population densities and two seasons. There were significant differences in grain yield between seasons, crop population densities and sowing combinations. Over all the treatments a 53% reduction in grain yield was realized in the second season. Doubling crop density gave a 35% increase in grain yield. The highest-yielding pure stand was cv. Dabr 1, and in mixtures was Dabr 1 with cv. Ariana. Over both seasons and crop population densities, mixtures consistently yielded more than the mean of their components, and 7 of these outyielded their more productive pure stands.

0593 PRETORIUS, A.J., and HUMAN, J.J. 1983. The influence of planting date, spacing and cultivar on the yield of grain sorghum.

(Af). Crop Production (South Africa) 12: 67-69. 14 ref. (Summary:En).

In field trials at Potchefstroom, South Africa, av. grain yield of 5 sorghum cv. differing in length of growing season sown in rows 50 cm apart to give 2,00,000 plants/ha was 8.28, 8.31, 7.05 and 4.80 t/ha and when sown in rows 200 cm apart to give 50,000 plants/ha was 9.48, 8.22, 6.70 and 3.59 t/ha, resp., for the 4 sowing dates. Av. yield was highest and lowest at 7.58 and 6.45 t/ha. In general responses were similar in short and long season cv. Grain yield decreased markedly with delay in sowing only at the wider row spacing.

0594 RADFORD, B.J., and NIELSEN, R.G.H. 1983. Extension of crop sowing time during dry weather by means of stubble mulching and water injection. Australian Journal of Experimental Agriculture and Animal Husbandry 23(122): 302-308.

The practices of stubble mulching and water injection were tested on wheat, sunflower, sorghum, and maize to determine what extension of crop sowing time they provided during dry weather at Queensland. Crop residues of sorghum, wheat and barley retained on the soil surface as mulches reduced soil water loss from the seedbed after prolonged soil drying. This resulted in a lower rainfall requirement to refill a mulched seedbed, despite some absorption of rainfall by the mulch itself. Higher soil water contents under mulch increased seedling emergence of crops after prolonged soil drying which effectively extended sowing time. Water injection at 60 ml/m extended sorghum, sunflower and maize sowing time by up to 2.5 d in dry soil but reduced sowing time of these three crops at high soil water levels (under mulch). It was concluded that the additional periods of sowing time obtained during dry weather from stubble mulching or water injection could help distribute the peak demand for labour during sowing operations more evenly.

0595 SASTRY, K.P., and KRISHNAMURTHY, K. 1983. Panicle development in sorghum as influenced by changes in sowing dates. Indian Journal of Agricultural Sciences 53(12): 1015-1021. 17 ref.

A 2-year study on the phasic development of some varieties of sorghum showed that the number of days taken to panicle iritiation differed significantly due to varieties, sowing dates, and their interaction. Panicle initiation, as well as spikelet differentiation, was enhanced with the advancement in sowings from January-September. The branch-initiation phase was more in the crops sown in January-April and September-December. The period between panicle intiation and stigma initiation in spikelets was more in the crops sown in January-March and October-December and less in the one sown in June-August. There was a significant negative relationship between minimum temperature and the total period of panicle development and a significant positive relationship between sunshine hours per day and period of panicle development.

0596 SUBBIAN, P., MUTHUVEL, P., and CHAMY, A. 1983. Study on the response of sorghum varieties to time of sowing and nitrogen levels. Madras Agricultural Journal 70(8): 523-524. 4 ref.

Field experiments were conducted at the Bhavanisagar, Tamil Nadu, India to study the response of sorghum varieties to time of sowing

and N levels in different seasons from 1977-78 to 1981-82. The results revealed that among the different time of sowings, sowing in early February and early July were found to be optimum for getting maximum yields in summer and kharif seasons. Nitrogen at 120/ha gave the maximum grain yields. Varieties USV, 3, USV, 5, CSH 5 and Co 23 were found to perform well.

0597 UMRANI, N.K., PATIL, C.B., and CHAVAN, K.B. 1983. Sowing time in winter sorghum cultivars. Sorghum Newsletter 26: 61.

Early sown cultivars yielded more grain and fodder than late sown cultivars on both shallow and medium deep soils. The percent reduction in grain yield/ha due to delayed sowing was 27 and 66 respectively, for the shallow soils and 16 and 35, respectively, for the medium deep soils. Fodder yields increased more in the early sown plants on both the types of soils than from later sown plants.

Farming Systems

0598 ABALU, G.O.I., ABDULLAHI, Y.A., AJAYI, O., FISHER, N.M., MANZO, S.K., MUSA, F.L., OGUNGBILE, A.O., and VOH, J.P. 1983. Exploratory survey of the farming systems of north-eastern Kano State, Nigeria. Samaru, Zaria, Nigeria: Ahmadu Bello University, Institute for Agricultural Research. 63 pp. 26 ref. (Department of Agricultural Economics and Rural Sociology, Working Paper no. 4).

The survey was carried out in 1982 to provide a case study of permanent cropping with millet. Millet fields were usually intercropped with sparse stands of sorghum and/or cowpea.

0599 ANANTHARAMAN, P.V., RAO, K.A., and KANDLIKAR, S.S. 1983. Growth patterns of certain dryland crops and their role in cropping systems. Agricultural Science Progress 1: 43-50.

0600 BATHKAL, B.G., and BHATAWADEKAR, P.U. 1983. Fertilizer management in cropping systems under rainfed situations of eastern Maharashtra. Pages 4-5 In Abstracts of papers for presentation at Seminar on Fertilizer Use in Cropping Systems under Rainfed Conditions, 5-6 December 1983, Solapur, Maharashtra, India. Solapur, Maharashtra, India: Dry Farming Research Station.

The results of the experiments on the fertilizer management in cropping systems of two course rotation, cotton-sorghum and cotton-groundnut, intercropping of sorghum and cotton with green gram/black gram and sequence cropping systems of green gram/black gram-safflower/pigeonpea are reported.

0601 DABHOLKAR, A.R., and LAL, G.S. 1983. Maximise your profits by intercropping jowar. Indian Farming 33(9): 41-44.

Soybean, pigeonpea and groundnuts are observed as remunerative intercrops with sorghum in Madhya Pradesh, India with proper spatial arrangement.

0602 DEL PUGLIA, S., and LO CASCIO, B. 1983. Yield possibilities of some irrigated forage cereals in Sicily. (It). Informatore Agrario 39(7): 24405-24406, 24409-24410, 24413-24414. 8 ref.

Sorghum grown for grain or silage was grown as main crop or catch

crop following wheat or barley with irrigation or without irrigation. Mean grain yields were 6.41 and 8.62 t and mean forage yields were 17.27 and 19.08 t in successive years.

0603 DESIDERIO, E. 1983. Grain sorghum and maize grown under rainfed conditions in central and southern Italy. (It). Informatore Agrario 39(11): 25019-25022, 25025-25028, 25031-25036. (Summary:En).

The results of maize and sorghum field trials, grown under rainfed conditions in Italy are discussed. Sorghum showed a greater adaptability as well as superior yielding ability when compared with maize. Maize and sorghum yields were limited by water deficit, not significantly by cultural practices. In 700-1000 m of altitude sorghum showed limited possibilities when grown for grain, but more suitable for silage production. The results obtained in environments characterized by water and/or temperature deficit, indicated that the yield potential of both maize and sorghum grown under rainfed conditions in central and southern Italy depended on the hybrids employed, and especially on their maturity class and adaptability.

0604 DEWALT, B.R., and ALEXANDER, S. 1983. The dynamics of cropping systems in Pespire, southern Honduras. Practising Anthropology 5(3): 11, 13.

The 3 types of slash and mulch systems practised in the region are discussed with reference to sorghum and maize. Need for improvement of sorghum production for food and feed is also stressed.

0605 DUNCAN, R.R. 1983. Ratoon cropping of sorghum: an alternative multiple cropping scheme. Crops and Soils Magazine 35(5): 10-11.

Information on management, advantages and disadvantages of ratoon cropping of grain and forage sorghum in USA is given.

0606 EKSHINGE, B.S., SHELKE, V.B., and MUSANDE, V.G. 1983. Correlation and path coefficient analysis in sorghum and pigeonpea grown in intercropping system. Journal of Maharashtra Agricultural Universities 8(1): 45-47.

Correlation and path coefficient analysis between yield and yield components were estimated in sorghum and pigeonpea grown in intercropping system. Among the yield components of sorghum, plant height, length of cob and weight of earhead exhibited significant positive association with grain yield. It was also observed that weight of earhead had the highest direct positive effect (P = 1.20466) on grain yield of sorghum and number of pods had the highest direct positive effect on grain yield of pigeonpea.

0607 FALEIROS, R.R. DE S., KANESIRO, M.A.B., NASCIMENTO, V.M. DO, and MELO, W.J. DE. 1983. Metabolic changes in sorghum and Lablab purpureus cultivated alone or intercropped. 1. Seasonal variations of carbohydrate content. (Pt). Cientifica 11(1): 99-106. 15 ref. (Summary:En).

Sowing L. purpureus between sorghum rows had no effect on carbohydrate synthesis in sorghum but L. purpureus had the lowest concn. of all forms of carbohydrate even after sorghum harvest.

0608 FARIS, M.A., ARAUJO, M.R.A. DE, LIRA, M. DE A., and ARCOVERE, A.S.S. 1983. Yield stability in intercropping studies of sorghum or maize with cowpea or

common bean under different fertility levels in northeastern Brazil. Canadian Journal of Plant Science 63(4): 789-799. 8 ref. (Summary:Fr).

Twenty-one trials were established from 1974 to 1978. The mean relative yield advantage of intercropping patterns as indicated by the land equivalent ratio (LER) 32%. The combined analysis of variance for the absolute total yields revealed that most of the pattern x environment interaction is accounted for by the heterogeneity of regressions. Cereals were more responsive to improvement in the environment resulting in increased yield. The regression lines of the intercropping patterns and sole cereals were closer to each other, due to the low yield contribution of the pulses to the intercropping total yield. However, the slopes of the intercropping pattern lines were closer to b = 1.0. On the basis of mean yield and regression slope, it was demonstrated that sole cereals on intercropping have better performance stability than sole pulses in northeastern Brazil.

0609 FARIS, M.A., BURITY, H.A., DOS REIS, O.V., and MAFRA, R.C. 1983. Intercropping of sorghum or maize with cowpeas or common beans under two fertility regimes in northeastern Brazil. Experimental Agriculture 19(3): 251-261. 7 ref.

Experiments in Brazil have shown that a sorghum, cowpea intercrop system yielded more grain than the monocrop system and produced a Land Equivalent Ratio (LER) greater than 1.00 even though rainfall was limited. Sorghum competed less than maize with the cowpea when Competitive Ratios (CR) were considered. In cowpea, CR values were correlated positively with the number of pods and seeds/plant. The two crops in the intercrop systems were responsive to fertilizer application. Thus, improved management was appropriate without the loss of the advantageous effects realized from intercropping.

0610 FARNWORTH, J., and SAID, S.A. 1983. The effect of fertilizing and seeding method on dryland production of yellow sorghum. Publication, Dhamar Agricultural Improvement Centre (Yemen Arab Republic) no. 59. 7 pp. 3 ref.

Seed of sorghum was sown on ridged and non-ridged plots and Nitrophos compound fertilizer was applied. Seed sown in ridge valleys showed better plant establishment. Total crop yields were low due to inadequate rainfall. To conserve moisture it is recommended to sow sorghum before the spring rains.

0611 FELTON, W.L. 1983. Introduction to the Regional Research Programme. Pages 1-6 In No-tillage crop production in northern New South Wales: proceedings of the Project Team Meeting, 4 May 1983, Tamworth, New South Wales, Australia (Martin, R.J., and Felton, W.L., eds.). Tamworth, New South Wales, Australia: Department of Agriculture.

Wheat-sorghum rotation in the no-tillage treatment was based on a non-residual herbicide fallow. Herbicide application and cultivation schedule at different sites of New South Wales is given.

0612 FELTON, W.L., HOLLAND, J.F., and FERRIS, I.G. 1983. Atrazine persistence. Pages 59-63 In No-tillage crop production in northern New South Wales: proceedings of the Project Team Meeting, 4 May 1983, Tamworth, New

South Wales, Australia (Martin, R.J., and Felton, W.L., eds.). Tamworth, New South Wales, Australia: Department of Agriculture. 6 ref.

Atrazine persistence and its effect in sorghum/wheat rotations under no-tillage was studied in 2 trials, one on an acid soil and an other on alkaline soil, the main plots being 4 fallow treatments. The sorghum yield was higher in no-tillage treatments than in the cultivated/treatments. Results of the trials also indicated that atrazine (up to 5 kgs/ha per year) increased the sorghum yield, in an acid soil and did not damage the following wheat crops. But in an alkaline soil atrazine was more persistent.

0613 GILLIVER, B., and PEARCE, S.C. 1983. Graphical assesment of data from intercropping factorial experiments. Experimental Agriculture 19(1): 23-31. 9 ref.

A graphical method, based on bivariate analysis, is used to present yield data from intercropping experiments involving pigeonpea and pearlmillet and pigeonpea and sorghum. The method is used to demonstrate two- and three-factor interactions in factorial experiments.

0614 HARGROVE, W.L., TOUCHTON, J.T., and JOHNSON, J.W. 1983. Previous crop [sorghum] influence on fertilizer nitrogen requirements for double-cropped wheat. Agronomy Journal 75(6): 855-859. 7 ref.

0615 HEGDE, B. 1983. Intercropping of fodder legumes in grain sorghum (Sorghum bicolor (L.) Moench) CSH-5 under paired row plantings. M.Sc. thesis, University of Agricultural Sciences, Dharwad, Karnataka, India. 100 pp.

The experiment consisted of 11 treatments with 2 methods of planting and 4 fodder legumes with 3 sole sorghums. Paired row planting of sorghum reduced the sorghum yield significantly as compared to entire sorghum in 45 cm rows due to reduced grain number and 1000-grain weight. None of the intercrops reduced sorghum yield significantly except doliches sown in 2 rows with 30-90 cm paired sorghum. All the intercropped treatments recorded increased returns over sole sorghum. Cowpea intercropped treatments recorded maximum return which was 31.6% higher over sole sorghum in 45 cm rows.

0616 HERRIDGE, D.F., and HOLLAND, J.F. 1983. Effects of tillage treatments in the fallow and grain legumes on production of dryland sorghum. Pages 74-80 In No-tillage crop production in northern New South Wales: proceedings of the Project Team Meeting, 4 May 1983, Tamworth, New South Wales, Australia (Martin, R.J., and Felton, W.L., eds.). Tamworth, New South Wales, Australia: Department of Agriculture. 6 ref.

The combination of tillage treatments in the pre-crop fallow and grain legumes in sorghum cropping was evaluated at two sites. Sites, fallow maintenance, species and sowing, plant sampling, estimation of N2 fixation and soil sampling are outlined. Sorghum and soybean gave better yields to no-tillage treatment than to the cultivated fallow.

0617 HONDURAS:SECRETARIA DE RECURSOS NATURALES, and HONDURAS:CENTRO AGRONOMICO TROPICAL DE INVESTIGACION Y ENSENANZA. 1983. Project of cropping systems: National Program of Agricultural Research [multiple cropping,

production, technology transfer, zea mays, Phaseolus vulgaris, sorghum, Honduras]. Annual report 1982. (Es). Comayagua, Honduras: Secretaria de Recursos Naturales, and Centro Agronomico Tropical de Investigacion Y Ensenanza. 139 pp.

0618 HONDURAS:SECRETARIA DE RECURSOS NATURALES, PROGRAMA NACIONAL DE INVESTIGACION AGRICOLA. 1983. Description and evolution of the maize-sorghum cropping system practised by the farmers of Palo Pintado and La Paz, Comayagua [Honduras]. (Es). Comayagua, Honduras: Secretaria de Recursos Naturales, Programa Nacional de Investigacion Agricola. 92 pp. 56 ref.

0619 ICRISAT. 1983. Farming systems. Pages 229-305 In Annual report 1982. Patancheru, Andhra Pradesh, India: ICRISAT.

In this chapter, information on resource evaluation,on-station component research, on-station operational research, systems analysis and modeling, on-farm testing of the Vertisol management technology, routine soils laboratory and future plans of research on ICRISAT's mandate crops including sorghum is presented.

0620 IRAT, FRANCE. 1983. Production systems for rainfed crops [sorghum]. (Fr). Pages 207-230 In Rapport annuel 1982. Paris, France: IRAT. 31 ref.

0621 IRAT, FRANCE. 1983. Production systems for the irrigated crop [sorghum]. (Fr). Pages 231-241 In Rapport annuel 1982. Paris, France: IRAT. 2 ref.

0622 IRAT, GUYANA. 1983. Study of a cropping rotation with sorghum grown in soil with slow vertical drainage. (Fr). In Rapport des activities en 1982. Cayenne, Guyana: IRAT.

0623 IRAT, GUYANA. 1983. Study of sorghum and soybean behaviour in sandy-clayey soil. (Fr). In Rapport des activites en 1982. Cayenne, Guyana: IRAT. 3 pp.

0624 IRRI. 1983. Croping Systems Program. Agronomic management in rice-based cropping patterns. Pages 487-512 In Annual report for 1981. Los Banos, Laguna, Philippines: IRRI.

Effect of plant density, row spacing and cutting height of rice on sorghum ratoon crop is considered in study of rice-based cropping patterns at IRRI, Philippines.

0625 JADHAV, A.S., DESHPANDE, S.V., and KALBHOR, P.N. 1983. Intercropping of safflower and grain in ratoon sorghum with different planting patterns under protective irrigations. II. Journal of Maharashtra Agricultural Universities 8(1): 66-68. 7 ref.

The grain and fodder yields of ratoon sorghum as well as monetary returns were not affected significantly due to different treatments in all the 3 seasons. The grain yield of ratoon sorghum increased by 7.32 and monetary returns by 5.07 per cent in a ratoon sorghum raised in paired planting system over sorghum raised in solid planting. Further, it was also noticed that the grain yield of ratoon sorghum was reduced by 10.20 and 4.70 per cent due to intercropping of safflower and gram in ratoon raised in paired planting compared with no intercrop.

0626 JADHAV, A.S., KALBHOR, P.N., and DESHPANDE, S.V. 1983. Intercropping of moong and groundnut in sorghum with different planting patterns under rainfed conditions. I. Journal of Maharashtra Agricultural

Universities 8(1): 63-65. 9 ref.

An increase in sorghum grain and fodder yields as well as total monetary returns was noticed, by following paired planting. The sorghum grain and fodder yields as well as total monetary returns were not affected significantly due to intercropping of moong and groundnut. The total monetary returns due to intercropping of moong and groundnut in paired planting increased by 9.91 and 13.37 per cent, respectively, over normal planting without intercropping.

0627 JONES, O.R., and JOHNSON, W.C. 1983. Cropping practices: Southern Great Plains. Pages 365-386 In Dryland agriculture (Dregne, H.E., and Willis, W.O., eds). Madison, Wisconsin, USA: American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America. 47 ref.

0628 JOSHI, P.K., and BORULKAR, D.N. 1983. Fertilizer management in intercropping of hybrid sorghum cv: CSH-5. Page 7 In Abstacts of papers for presentation at Seminar on Fertilizer Use in Cropping Systems under Rainfed Conditions, 5-6 December 1983, Solapur, India. Solapur, Maharashtra, India: Dry Farming Research Station.

Intercropping of hybrid sorghum with green gram in skipped row planting with an additional fertilizer dose of 25 per cent of the intercrop was found most economical at the Model Agronomic Experiment Centre at Parbhani, India.

0629 KATARE, R.A., BHALE, V.M., and MULGIR, K.S. 1983. Fertilizer management under sorghum/pigeonpea and pearl millet/pigeonpea. International Pigeonpea Newsletter 2: 31-32.

The application of the recommended dose of fertilizer only to the main crop (pigeonpea) of the system appeared to be the best management approach.

0630 KAWAMOTO, Y., MASUDA, Y., and GOTO, I. 1983. Growth of sorghum in the mixed culture with forage soybean. (Ja). Journal of Japanese Society of Grassland Science 29(3): 196-203. 13 ref. (Summary:En).

A mixed culture experiment in which each of 2 sorghum varieties was associated with 2 soybean varieties respectively was conducted in Japan, to evaluate the effects on the dry matter production, efficiency of light energy utilization and other growth factors. The relative dry matter yield total in all the mixed cultures was more than one. The efficiency of light energy utilization and the CGR of sorghum in the mixed cultures were higher than the sorghum pure cultures at later growth stages. The higher NAR in the mixed cultures was due to increased net photosynthesis per unit leaf area and lower SLA of sorghum in the mixed cultures. There was no competition between the 2 crops.

0631 KEELEY, P.E., THULLEN, R.J., MILLER, J.H., and CARTER, C.H. 1983. Comparison of six cropping systems for yellow nutsedge (Cyperus esculentus) control. Weed Science 31(1): 63-67.

Six cropping/weed control systems were evaluated from 1978 to 1980 for the control of yellow nutsedge at California, USA. Reduction of nutsedge tubers (97%) was obtained by double cropping potatoes with milo for 2 yr. before growing cotton.

0632 KEERIO, H.K. 1983. Effect of intercropping sorghum with fodder legumes. Pages 645-652 In More food from better technology (Holmes, J.C., and Tahir, W.M., eds.). Rome, Italy: FAO. 16 ref.

Sorghum was grown alone or intercropped with cowpea, guar, soybean or mothbean for fodder or green manure in field trials at New Delhi, India. Intercropping increased sorghum grain yield, CP content and N uptake.

0633 LIRA, M. DE A., TAVARES FILHO, J.J., TABOSA, J.N., and MACIEL, G.A. 1983. Effect of four sorghum genotypes on intercropped cowpea yields. Sorghum Newsletter 26: 49.

Results showed no advantage for intercropping cowpea with the four sorghum lines tested under the experimental conditions. Intercropped sorghum yielded less than sorghum alone. The cowpea yields were low when they were intercropped with sorghum.

0634 MACEDO, M.C.M. 1983. Principles of intercropping: effects of crop combination, row arrangement, and plant density on yield, yield equivalency ratios and recovery of fertilizer-applied nitrogen by legume-nonlegume intercrops. Ph.D. thesis. North Carolina State University, Raleigh, North Carolina, USA. 136 pp.

Intercrops of corn, sorghum and soybeans were grown to test the yield and canopy height relationship, recovery of N fertilizers, plant densities and yields. Sorghum and soybeans were equally competitive because of similar canopy heights and ratooning habit of sorghum.

0635 NAMBIAR, P.T.C., RAO, M.R., REDDY, M.S., FLOYD, C.N., DART, P.J., and WILLEY, R.W. 1983. Effect of intercropping on nodulation and N2-fixation by groundnut. Experimental Agriculture 19(1): 79-86. 11 ref.

Nodulation and N2-fixation of groundnut were investigated in sole and intercropping systems in Andhra Pradesh, India. Intercropping with pearl millet, maize, or sorghum reduced nodulation and N2-fixation. This effect is ascribed to the shading of groundnut by the cereal component and the consequent decrease in photosynthesis of the legume canopy.

0636 NARKHEDE, P.L., and UMRANI, N.K. 1983. Organic recycling of su-babool (L. leucocephala) for rabi sorghum under dryland conditions. Pages 2-3 In Abstracts of papers for presentation at Seminar on Fertilizer Use in Cropping Systems under Rainfed Conditions, 5-6 December 1983, Solapur, Maharashtra, India. Solapur, Maharashtra, India: Dry Farming Research Station.

A field experiment was conducted on a Vertisol in Maharashtra, India to explore the possibilities of growing Leucaena leucocephala in association with rabi sorghum for supplying organic N by incorporating green loppings in the soil. The incorporation of su-babool loppings increased the yield, nutrient uptake of sorghum, and organic carbon content of the soil.

0637 NIMBALKAR, V.S., and DOMBALE, B.B. 1983. Intercropping studies in grain sorghum. Sorghum Newsletter 26: 54.

Sorghum intercropped with black gram gave the highest monetary return compared to sorghum alone and sorghum intercropped with soybean, castorbean, sunflower, and sesamum. Sunflower intercropped

with sorghum suppressed sorghum yields.

0638 NIMBALKAR, V.S., and SHINDE, N.V. 1983. Intercropping of mung, cowpea and tur in sorghum. Sorghum Newsletter 26: 55.

The results showed that highest grain yields of sorghum were obtained from sorghum grown alone. Pigeonpea grown as an intercrop increased monetary returns over those from sorghum alone. Additional gross returns by intercroping sorghum with pigeonpea were, 7.0% with mung, and 2.0% with cowpea. The maximum gross return was obtained from sorghum planted in solid planting with one row of pigeonpea as an intercrop.

0639 PAVLISH, L.A., FRANCIS, C.A., RAJEWSKI, J.F., and ZWEIFEL, T.R. 1983. Sorghum-soybean intercropping patterns in two Nebraska environments. Sorghum Newsletter 26: 68-69.

A consistant inverse relationship between yields of the two crops in each intercrop pattern was noted in both dryland and irrigated conditions.

0640 PRASAD, R. 1983. Economic and efficient use of plant nutrients. Pages 400-411 In More food from better technology (Holmes, J.C., and Tahir, W.M. eds.). Rome, Italy: FAO. 15 ref.

The response of sorghum and other crops in rotation with wheat to P fertilizer and trace elements is reviewed.

0641 PRASAD, R. 1983. Increased crop production through intensive cropping systems - Indian experience. Pages 313-322 In More food from better technology (Holmes, J.C., and Tahir, W.M., eds.). Rome, Italy: FAO. 10 ref.

Cropping patterns in irrigated and rainfed areas of India are described. Intercropping of sorghum with soyabeans is included in the study.

0642 QUAGLIETTA CHIARANDA, F., and VENEZIAN SCARASCIA, M.E. 1983. Water uptake of sorghum and of maize as catch crops. (It). Informatore Agrario 39(11): 25003-25007.

The problems of catch cropping sorghum and maize in field trials at Italy were studied. It was found that the grain yields of sorghum increased with the increase in volume of irrigation water applied.

0643 RAMAKRISHNA, A. 1983. Studies on intercropping systems on rainfed lands under varying levels of fertility and moisture regimes. Ph.D. thesis, Haryana Agricultural University, Hisar, Haryana, India. 83 pp.

An investigation was carried out at Hisar, India to verify the technical feasibility and economic viability of intercropping in northwest India. The main plot treatments consisted of 3 levels of fertility and 2 levels of moisture regimes. Sorghum, pearlmillet, pigeonpea and greengram were grown in solo and in combinations. The yield of cereal increased susbtantially when intercropped with a legume. Highest income was obtained from sorghum + greengram and pearlmillet + greengram intercroppings. Intercrops used soil moisture more efficiently than sole crops. Fertilizers increased the yield and soil moisture use efficiency of both solo and intercrops.

0644 RAMTEKE, J.R., and BIRARI, S.P. 1983. Fertilizer management in cropping systems under rainfed conditions. Page 6 In

Abstracts of papers for presentation at Seminar on Fertilizer Use in Cropping Systems under Rainfed Conditions, 5-6 December 1983, Solapur, Maharashtra, India. Solapur, Maharashtra, India: Dry Farming Research Station.

Research in India on fertilizer management is reviewed. Organic manures are recommended for kharif crops for optimum nitrogen economy. Growing fodder cowpea as an intercrop of sorghum could increase the yield of sorghum and could save about 20 kg N/ha for base crop of sorghum.

0645 RAO, J.V.D.K.K., DART, P.J., and SASTRY, P.V.S.S. 1983. Residual effect of pigeonpea (Cajanus cajan) on yield and nitrogen response of maize. Experimental Agriculture 19(2): 131-141. 15 ref.

Field experiments were conducted on a Vertisol soil at ICRISAT, India, to examine the residual effect of pigeonpea on growth and yield of a following maize crop. Pigeonpea was grown alone or as an intercrop with sorghum fertilized or not with 80 kg N/ha. Sorghum alone and fallow treatments were included for comparison. In the first year, the sorghum/pigeonpea intercrop produced the largest grain and dry matter yields, but the yield of intercropped pigeonpea was about 50% less than that produced by the sole crop. Pigeonpea alone had a large residual effect on maize, increasing grain yield by 57% and total plant dry matter by 32% compared with corresponding values after fallow. In comparison, intercrop pigeonpea had little residual effect. Maize following either fallow, sorghum grown alone, with or without N, or the sorghum/pigeonpea intercrop, again with or without N, required fertilizer equivalent to 38-49 kg N/ha in order to attain yields similar to that of unfertilized maize following sole crop pigeonpea.

0646 RAO, M.R., and WILLEY, R.W. 1983. Effects of genotype in cereal/pigeonpea intercropping on the Alfisols of the semi-arid tropics of India. Experimental Agriculture 19(1): 67-78.

In a 2 row cereal: 1 row pigeonpea intercropping system, four sorghum and two millet genotypes were examined with four of pigeonpea on a medium-deep Alfisol during 1978 and 1979. The cereals usually produced a large proportion of their sole crop yields. Early and/or short sorghums produced large LERs (1.51-1.59) and combinations with an early hybrid also gave good returns. A tall late sorghum gave poor yields of both components, smallest total LER (1.30), and little return. Pigeonpea intercrop yields became larger as the maturity difference between the cereal and pigeonpea increased. A combination of a short, early but large-yielding cereal with a pigeonpea that is as late as possible without incurring undue risk of moisture stress may be ideal.

0647 RAO, M.R., and WILLEY, R.W. 1983. Effects of pigeonpea plant population and row arrangement in sorghum/pigeonpea intercropping. Field Crops Research 7: 203-212. 10 ref.

A sorghum/pigeonpea intercropping experiment carried on a deep Vertisol in India examined the response to pigeonpea in a 150 cm bed and furrow system at 3 row arrangements per bed: (a) 1 row sorghum : 1 row pigeonpea : 1 row sorghum at 45 cm between rows (SPS); (b) 1 row sorghum : 2 rows pigeonpea : 1 row sorghum at 30 cm

between rows (SPPS); and (c) 1 row pigeonpea: 2 rows sorghum: 1 row pigeonpea at 30 cm between rows (PSSP). Maximum land equivalent ratio and gross monetary returns were at 70,000 plants/ha for the SPS arrangement and at 40,000 plants/ha for the SPPS and PSSP arrangements. The sorghum intercrop reduced the total branch number in pigeonpea but had little effect on the number of pod-bearing branches. Intercropping also increased the harvest index of pigeonpea because the sorghum suppressed the early vegetative growth but was harvested before the reproductive phase.

0648 SCHMIT, V. 1983. Study of the influence of the legume/Rhizobium symbiosis on associated Sorghum bicolor (L.) Moench./Vigna unguiculata (L.) Walp. (Fr). Bulletin des Recherches Agronomiques de Gembloux 18(4): 231-239. 5 ref. (Summary:En).

The experiments were made in greenhouse and growth chamber. The observation of the yield components showed the positive influence of the inoculation of Rhizobium on cowpea. Inoculation was of little benefit to sorghum.

0649 SERPA, J.E.S., and BARRETO, A.C. 1983. Evaluation of grain sorghum cultivars in association with French bean (Phaseolus vulgaris L.) and with short-staple cotton in the Homogeneous Microregion 130 of the state of Sergipe. (Pt). Pesquisa em Andamento, UEPAE de Aracaju, EMBRAPA no. 13. 3 pp.

In trials of 5 sorghum cv. in two-crop mixtures, the highest French bean yields were not associated with the highest-yielding sorghums. When sorghum, French bean and cotton were grown together, the highest cotton yield was obtained in association with the lowest-yielding sorghum cultivar and the highest yield of French beans with the next lowest yielding.

0650 SINGH, S., SRIVASTAVA, U.S.L., and SINGH, B. 1983. Studies on planting system and intercropping in hybrid sorghum under rainfed conditions. Indian Journal of Agronomy 28(1): 92-94. 4 ref.

Field trials were conducted during rainy seasons of 1973 and 1974 at Kanpur on loam soils. The treatments included 8 combinations of 4 crops (sorghum pure, sorghum + black gram, sorghum + green gram, sorghum + soybean) and 2 sowing methods. 3 treatments of pure intercrops were also added. The grain yield of sorghum interplanted with black gram was significantly higher during the first year. Planting system showed no significant effect on yield. As intercrops with sorghum, black gram for good soil moisture conditions and green gram for moisture deficit conditions were found suitable.

0651 SINGH, S.P. 1983. Intercrop sorghum with legumes. Indian Farming 33(6): 8-10.

Different legumes were tested for their suitability as intercrop under rainfed as well as irrigated conditions. Intercropping of fodder cowpea, grain cowpea, black gram, green gram and groundnut crops with sorghum increased monetary returns by 120, 64, 58, 48, and 32 per cent respectively over the sole crop of sorghum under rainfed conditions. Under irrigated conditions, the monetary advantage over sole sorghum was of the order 34, 54, 134, 93 and 39 per cent due to green gram, grain cowpea, fodder cowpea, groundnut and soybean respectively. The results also indicated that the

intercropping with suitable cultivars with sorghum increased total productivity over space and time.

0652 SINGH, S.P. 1983. Planned intercropping can improve yields on small farms. International Agricultural Development 3(1): 8-10.

Sorghum sown at 45 cm row distance was compared with paired row systems of sorghum and legumes. Paired sorghum at 30 cm between rows and 90 cm between paired rows gave the best results. The yield of sole sorghum was 2.78 t/ha which increased by 22%, 20%, 29%, 37% and 14% when intercropped with green gram, black gram, grain and fodder cowpeas and groundnuts, respectively, under rainfed conditions. A preceding intercropping of green gram, groundnut, grain and fodder cowpeas, and soyabean with sorghum increased the succeeding wheat crop as compared with sole sorghum.

0653 SINGH, S.P. 1983. Summer legume intercrop effects on yield and nitrogen economy of wheat in the succeeding season. Journal of Agricultural Science (UK) 101(2): 401-405. 9 ref.

In irrigated trials during 2 yr at IARI, New Delhi, India, wheat following legume intercrops showed greater growth, yield, yield components and N uptake than after sorghum. Intercrops of groundnuts, cowpeas and green gram grown between sorghum decreased the fertilizer N requirement of wheat in the following season by 30-84 kg/ha compared with sorghum.

0654 TAMURA, K., and HATAKEYAMA, S. 1983. Sequential cultivation of sorghum after rice cultivation. (Ja). Kyushu Agricultural Research 45: 181.

0655 TAPADIA, B.B., KATARE, R.A., and BHALE, V.M. 1983. Intercropping pulses and oilseeds in rabi sorghum in Maharashtra. Journal of Maharashtra Agricultural Universities 8(3): 225-226. 5 ref.

The field experiments conducted during the years 1978-79, 1979-80 and 1980-81 revealed that the monetary returns can be increased by intercropping of oilseeds and pulses in rabi sorghum. The monetary returns were maximum when the crop was intercropped with safflower.

0656 TRACRE, O.D. 1983. Effects of the ordering of seed-plots and of the ground relief on the association of cereals and beans. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 60 pp.

0657 UMAT, D.S., and DESHPANDE, S.L. 1983. Effect of legumes in sorghum based intercropping systems. Sorghum Newsletter 26: 53.

When sorghum was raised with cowpea for fodder and nitrogen was applied at the rate of 80 kg/ha, sorghum yielded at par with sole sorghum at 120 kg/ha N level.

0658 UMAT, D.S., and DESHPANDE, S.L. 1983. Response of redgram genotypes to various plant populations in sorghum intercropping systems. Sorghum Newsletter 26: 54.

Results revealed that no significant differences occurred among sorghum plots raised in different farming systems. It was noticed that pigeonpea C 11 gave maximum yield when it was either grown alone or as an intercrop with sorghum at populations 40,000 and 80,000 per ha., respectively.

0659 VECCHIETTINI, M., and

GASPARI, F. 1983. Comparison between continuous sorghum cropping and the sorghum-wheat rotation. (It). Informatore Agrario 39(13): 25201-25204. 6 ref.

The trials were conducted at Modena, Italy during 1977-82. Sorghum grain yields were 6.03 t/ha in continuous cropping, 7.29 t in rotation with wheat, 6.83 t in removed, and 6.49 in incorporated and 0-300 kg N/ha applied. The yields increased from 5.15 to 7.38 t with increase in N rate.

0660 VERMA, J.K., and PANDEY, B.B. 1983. Evaluation of late pigeonpeas for intercropping with sorghum. International Pigeonpea Newsletter 2: 24-25.

The intercropping of sorghum with pigeonpeas did not affect the yield of sorghum but increased the gross income substantially.

0661 VERMA, J.K., SINGH, B.P., and YADAVA, G.L. 1983. Returns from intercropping pulses with sorghum in Rajasthan. International Pigeonpea Newsletter 2: 29.

Sorghum and the legumes were grown in alternate rows 30 cm apart to test the suitability of legumes for intercropping with sorghum. Intercropping of pigeonpeas or soybeans with sorghum gave the greatest gross returns over the two seasons tested at Rajasthan, India.

0662 WALLENS, P.G. 1983. A comparison of no-tillage and mechanical tillage fallow costs in northern NSW. Pages 178-190 In No-tillage crop production in northern New South Wales: proceedings of the Project Team Meeting, 4 May 1983, Tamworth, New South Wales, Australia (Martin, R.J., and Felton, W.L., eds.). Tamworth, New South Wales, Australia: Department of Agriculture.

Fallow costs of wheat-wheat fallow and of wheat-sorghum fallow of 1982/83 season are given. In wheat-sorghum fallows large yield increases were achieved regularly by no-tillage. The average cost differential for the wheat-sorghum fallows was greater than for the wheat-wheat fallows. No-tillage techniques resulted in 25% yield increase in sorghum grown after a long fallow from wheat.

0663 WICKS, G.A. 1983. Integrated systems for control or management of downy brome (Bromus tectorum L.). Abstracts of 1983 Meeting of the Weed Science Society of America. pp. 22-23.

Rotation of wheat with maize, sorghum, soybeans, millet, oats or barley was the simplest method to control downy brome in wheat.

0664 WILLEY, R.W., NATARAJAN, M., REDDY, M.S., RAO, M.R., NAMBIAR, P.T.C., KANNAIYAN, J., and BHATNAGAR, V.S. 1983. Intercropping studies with annual crops. Pages 83-100 In Better crops for food: Ciba Foundation Symposium 97. London, UK: Pitman. 19 ref.

Growth studies with sorghum/pigeonpea and millet/groundnut are described to show how intercropping systems can achieve larger yields than the sole crops, even under moisture stress conditions. Effects of a sorghum intercrop on the incidence of pod borer and wilt disease in pigeonpea are described. Evidence for improved yield stability is provided from a review of 94 experiments on sorghum/pigeonpea.

0665 ZAPATA, F., and BOLE, J.B. 1983. The FAO/IAEA coordinated research programme on nuclear techniques in the development of

fertilizer and water management practices for multiple cropping systems. FAO Fertilizer and Plant Nutrition Bulletin 5: 24-30.

A nitrogen fertilizer experiment with soyabeans intercropped with sorghum is presented as a progress report.

Weeds and Weed Control

0666 ABDEL-GALIL, K.E. 1983. Weed control (groundnuts; cotton; kenaf; sorghum; sesame. Sudan). Pages 34-41 In Annual report 1978-1979. Kenana, Sudan: Kenana Research Station.

0667 ADAMS, C.A., BLEE, E., and CASIDA, J.E. 1983. Dichloroacetamide herbicide antidotes enhance sulfate metabolism in corn roots. Pesticide Biochemistry and Physiology 19(3): 350-360. 19 ref.

Effect of R-25788 and R-29148 on sulphate content of crops including milo was studied. The antidotes were found to decrease the sulphate levels in the leaves of milo.

0668 AOKI, H., and MITSUI, Y. 1983. Weed control in sorghum. (Ja). Bulletin of the Chiba Prefectural Livestock Experiment Station 7: 71-77. 16 ref.

0669 ARIAS, J., MARTIN, M.E., and GIMENEZ M., J. 1983. Chemical control of new weed in north western Argentina, Tithonia tubaeformis (Jacq.)-Cass. (Es). Malezas 11(5): 177-181. 4 ref.

The weed had smothering effect and spread rapidly in sorghum, maize and beans. 0.5 kg paraquat and 0.2 kg paraquat + 0.236 kg 2,4-D butyl ester/ha controlled the weed for 19 days. 0.492 kg 2,4-D butyl ester with or without 1.16 kg MH diethanol amine/ha gave 70% control 30 days after treatment. The weed was resistant to MH alone and control with 0.124 kg dicamba + 0.357 kg 2,4-D diethyl amine/ha was poor.

0670 BALLERSTEDT, P.J., and BANKS, P.A. 1983. Behavior of alachlor and metribuzin as affected by soil pH. Page 89 In Proceedings of the Fourteenth International Grassland Congress, 15-24 June 1981, Lexington, Kentucky, USA (Smith, J.A., and Hays, V.W., eds.). Boulder, Colorado, USA: Westview Press.

Al tolerant and nontolerant sorghum was used in a greenhouse studies to examine the effect of soil fumigation and soil pH on herbicides. Fumigation increased the herbicides persistence. Soil pH did not affect the behaviour of herbicides. Alachlor was less persistent at the highest pH level than with the lowest level. The activity of metribuzin in the nontolerant sp. decreased due to Al toxicity at lowest pH level.

0671 BANKS, P.A., and DUNCAN, R.R. 1983. Weed-control evaluations in ratoon-cropped grain sorghum (Sorghum bicolor). Weed Science 31(2): 254-258. 13 ref.

Weed control evaluations in ratoon sorghum in Georgia, USA showed that >80% weed control in the 2nd crop can be achieved by applying metolachlor + propazine at 2.2 kg/ha preemergence, followed by application after 1st harvest of paraquat and pendimethalin at 0.3 and 0.8 kg/ha, respectively. The ratoon yields did not differ significantly from each other irrespective of treatments.

0672 BARRETT, M., and MEGGITT, W.F. 1983. 1983 weed control guide for field crops.

Extension Bulletin, Michigan State University Cooperative Extension Service no. 434. 45 pp.

The guide includes information on cultural and chemical control of weeds of field crops including sorghum. Instructions for the preemergence and postemergence use of herbicides are given separately for individual crops.

0673 BARRETT, M.R., and LAVY, T.L. 1983. Effects of soil water content on pendimethalin dissipation. Journal of Environmental Quality 12(4): 504-508. 18 ref.

Laboratory and field studies were conducted to evaluate pendimethalin dissipation over time in a Crowley silt loam (Typic Albaqualfs). The ratio of pendimethalin residues in laboratory systems detected by a root bioassay with grain sorghum to those detected with gas-liquid chromatography (GLC) declined by 17% from 0 to 56 d after treatment. Soil water content had a strong influence on the amount of pendimethalin that dissipated, especially for about the first 2 weeks after herbicide application. Half-lives in the field were much shorter during the initial 2 weeks than after 2 weeks, with >50% of the applied herbicide having disappeared in 1 week for all treatments except in soybeans the first year.

0674 BEBAWI, F.F., and ABDELAZIZ, A.H. 1983. Effects of cultivar mixtures, fertilizer, and plant density on grain sorghum (Sorghum bicolor)/Striga hermonthica relations. Weed Science 31(4): 552-556. 15 ref.

The cultivation of equiproportional mixtures of relatively resistant and susceptible grain sorghum varieties, coupled with the use of high rates of nitrogenous fertilizer and wider inter- and intra-row spacing, was a better cultural practice under dense Striga infestations in Sudan.

0675 CABALLERO, L.M., PEIRANO, S., and GALARDO, M. 1983. Control of weeds in grain sorghum crops with primextra 50 FW and the use of Concep 25 SCW as a herbicide antidote. (Es). Malezas 11(2): 171-178. 3 ref.

0676 CHANG, T.S. 1983. Structure-activity relationships of oximes and related compounds as seed safeners. Ph.D. thesis, Texas A & M University, College Station, Texas, USA. 116 pp.

The studies suggested that chemicals containing an oxime or a pyridyl group provided protection to sorghum against metolachlor. Grain sorghum seeds treated with pyridine-2-aldoxime O-benzyl ether at a rate of 0.75 g/kg of seed could be stored without a loss of safening activity against metolachlor.

0677 CHOLAKY, L., SAYAGO, F.F., ZORZA, E.J., GESUMARIA, J.J., CASTILLO, C.A., and DEMO, M.A. 1983. Control of weeds in grain sorghum. (Es). Malezas 11(2): 236-248. 31 ref.

In a trial comparing mechanical and chemical weed control in grain sorghum using atrazine and linuron pre-sowing or pre-em. and 2,4-D-amine post-em., the best grain and straw yields were obtained with 1.5 kg atrazine/ha pre-sowing.

0678 DELVO, H.W. 1983. Herbicide use on major field crops in 1981. Abstracts of 1983 Mee ing of the Weed Science Society of America. p. 24.

Sorghum is one of the major crops

studied for the survey of farmer's use of pesticides by United States Department of Agriculture.

0679 DEVLIN, D.L., MOSHIER, L.J., RUSS, O.G., and STAHLMAN, P.W. 1983. Antidotes reduce injury to grain sorghum (Sorghum bicolor) from acetanilide herbicides. Weed Science 31(6): 790-795. 11 ref.

CGA-43089, CGA-92194 and MON-4606, applied as seed treatments at 1.25 g/kg seed, prevented yield losses in sorghum in the field due to metolachlor, alachlor or acetochlor applied at 1.7, 2.2 and 1.7 kg/ha, respectively. CGA-92194, applied at 0.8 g/kg seed, prevented yield reduction from metolachlor applied at 4.5 kg/ha. MON-4606 was more effective in protecting grain sorghum when applied as a seed treatment than when applied in the furrow with a clay or sand granule as carrier.

0680 DOWLER, C.C., NICHOLS, R.L., and SWANN, C.W. 1983. Weed control for sorghum in the Southeastern Coastal Plain. Research Bulletin, Georgia Agricultural Experiment Stations no. 303. 20 pp. 38 ref.

Experiments were conducted to measure the effect of several weed control treatments on crop tolerance, weed control efficacy, and on yields in coarse textured soils. The most promising weed control method was the use of atrazine alone or in combination with metolachlor or pendimethalin as early postemergence treatments. Texas panicum was controlled better with preemergence treatments and when rainfall followed planting.

0681 EZRA, G., and STEPHENSON, G.R. 1983. Can sub-toxic herbicide pretreatments increase tolerance to herbicides? Page 281 In Proceedings of the Tenth International Congress of Plant Protection, 20-25 November 1983, Brighton, UK. v. 1. Croydon, UK: British Crop Protection Council. 2 ref.

Metribuzin was applied to tomato and soyabean and alachlor to sorghum and maize and allidochlor to maize to study the effectiveness of herbicide pretreatments. Alachlor pretreatment did not protect sorghum from later alachlor injury.

0682 FOY, C.L., and WITT, H.L. 1983. Seed protectants as antidotes against chloroacetamide herbicide injury in grain sorghum. Abstracts of 1983 Meeting of the Weed Science Society of America. pp. 103-104.

Alachlor and metolachlor caused serious injury to sorghum without the seed protectants, Concep R and Screen TM. The injury was significantly reduced with the seed protectants. Minor injury was caused to sorghum by propachlor with or without the seed protectants. But propachlor was less effective in controlling weeds than alachlor and metolachlor. Early season weed control was found excellent.

0683 FRANS, R., GULLEY, T., and TERHUNE, E. 1983. Herbicide field evaluation trials on field crops, 1982. Mimeograph Series, Arkansas Agricultural Experiment Station 306: 1-3, 7, and 64-74.

Results of the primary and secondary advanced herbicide trials on field crops including sorghum conducted at Arkansas, USA are presented.

0684 FROST, K.R., JR. 1983. Grain sorghum seed safener studies with flurazole (Screen TM) in western Florida. Proceedings of the Southern Weed Science Society 36:

46-50. 2 ref.

Over a 3 yr. period, seed treatments with flurazole, the active ingredient in Screen TM seed protectant, effectively safened grain sorghum to preemergence applications of alachlor, acetochlor, metolachlor and with or without atrazine on light, sandy soils and under high rainfall conditions in western Florida. Yields from herbicide treatments were always improved with flurazole, ranging from 14% in the case of metolachlor to 98% in the case of acetochlor over the unsafened but oversprayed check.

0685 GARCIA, F.D., RUBIOLO, O.J., VENTURA, J.L., and STEFFANAZZI, R.B. 1983. Effect of weeds in grain sorghum crops in the semiarid Pampas region. (Es). Malezas 11(3): 62-67. 11 ref.

0686 GREER, H.A.L., and DENMAN, C.E. 1983. Weed control in grain sorghum. OSU Extension Facts, Oklahoma State University, Cooperative Extension Service no. 2763. 4 pp. 10 ref.

The use of herbicides along with good cultural practices will help control weeds and make crop production profitable.

0687 HATZIOS, K.K. 1983. Effects of CGA-43089 on responses of sorghum (Sorghum bicolor) to metolachlor combined with ozone or antioxidants. Weed Science 31(2): 280-284. 29 ref.

The potential interactive effects of metolachlor treatments combined with the air pollutant ozone or piperonyl butoxide and n-propyl gallate, on the growth of sorghum seedlings that were protected or unprotected with the antidote, CGA-43089 were examined. In the absence of CGA-43089, growth responses of sorghum to combination treatments of metolachlor with ozone or propyl gallate suggested an additive effect, although some treatments of metolachlor combined with piperonyl butoxide interacted synergistically.

0688 HATZIOS, K.K., and YANG, Y.S. 1983. Ozone-herbicide interactions on sorghum (Sorghum bicolor) and velvetleaf (Abutilon theophrasti) seedlings. Weed Science 31(6): 857-861. 25 ref.

The potential interactive effects between the herbicides chlorsulfuron, PP009, and BAS 9052 OH and the air pollutant ozone (O3) on the growth of sorghum and velvetleaf were examined. All 3 herbicides were applied postemergence either before or after a single 6-h fumigation of seedlings with O3 at 0, 0.1, and 0.2 ppmv. The interactive effects of all 3 herbicides with O3 on sorghum seedlings were additive regardless of the sequence of O3 fumigation and herbicide treatment.

0689 IWATA, I., TAKAYANAGI, S., and IGITA, K. 1983. Comparative study on emergence pattern of the main summer weeds, and upland crops reaction to weed damage. (Ja). Bulletin of the Kyushu National Agricultural Experiment Station 23(2): 153-204. 75 ref. (Summary:En).

Weed emergence patterns were studied in upland crops of Kyushu, Japan. Air temperature affected the emergence patterns. Weeds had less effect on growth and yield of sorghum than the other crops studied.

0690 JEFFREY, L.S., HAYES, R.M., and MCCUTCHEN, T.C. 1983. Weed control in no-till grain sorghum. Proceedings of the Southern Weed Science Society 36: 45. (Abstract).

Atrazine and propazine gave excellent weed control in sorghum. But there were yield reductions. Yield reductions from atrazine was greater when sorghum was sown into the wheat stubble.

0691 KEELING, J.W., and ABERNATHY, J.R. 1983. Rotational crop response to fluridone and norflurazon. Proceedings of the Southern Weed Science Society 36: 155. (Abstract).

Application of pre-sowing or pre-emergence fluridone or norflurazon to wheat sown in September and sorghum in the following May caused crop injury. In sorghum, 13 months after application, fluridone was not phytotoxic but norflurazon caused 40-90% crop injury. Pre-sowing incorporated norflurazon was more phytotoxic and persisted longer than pre-emergence treatments.

0692 KETCHERSID, M.L., and MERKLE, M.G. 1983. Effect of protectants on sorghum seedling respiration. Proceedings of the Southern Weed Science Society 36: 384. (Abstract).

Sorghum seeds were treated with CGA-43089, CGA-92194 or MON-4606 as protectants against metolachlor. In the absence of the herbicide, the untreated seeds emerged earlier than treated seeds. During germination, treated seeds showed decreased respiration. Growth was inhibited most by CGA-43089.

0693 KETCHERSID, M.L., VIETOR, D.M., and MERKLE, M.G. 1983. CGA-43089 effects on metolachlor uptake and membrane permeability in grain sorghum (Sorghum bicolor). Journal of Plant Growth Regulation 1(4): 285-294. 23 ref.

0694 LATCHANNA, A. 1983. The major weed flora in certain winter crops of Parbhani area. Indian Journal of Weed Science 15(1): 109-114. 5 ref.

Based on the visual rating observation, the weeds associated with sorghum and other crops, in Parbhani, Maharashtra, India are presented. The season of sowing for each crop and critical periods of weed competition are also given.

0695 LOPEZ, J.A., and GALETTO, A. 1983. Effect of weed competition on different stages of crop growth in sorghum. (Es). Malezas 11(2): 52-72. 13 ref.

0696 MALI:MINISTERE DE L'AGRICULTURE, CELLULE DEFENSE DES CULTURES. 1983. Results of the season 1982-1983: weeds [in corn, millets, rice and sorghum, Mali]. (Fr). Bamako, Mali: Institut d'Economie Rurale. 22 pp.

0697 MALIK, R.K., and BHAN, V.M. 1983. Weeds - a potential danger to crop production. Pesticides, Annual. pp. 95-96.

Crop losses due to weeds, effect of weed control on the yield of sorghum and other crops and critical period of weed crop competition are discussed.

0698 MARTIN, J.R., and HERRON, J.W. 1983. Chemical control of weeds in farm crops [sorghum] in Kentucky--1983. Lexington, Kentucky, USA: University of Kentucky, College of Agriculture, Cooperative Extension Service. 46 pp. (AGR, 6).

0699 MARTINEZ MIRALDA, J.R. 1983. Herbicide evaluation in sorghum (Sorghum bicolor (Linn) Moench) cultivation in Olancho during the cycle 82 "B" [Honduras]. (Es). Thesis, Universidad Nacional Autonoma de Honduras, Tegucigalpa, La Ceiba, Honduras. 45 pp. 8 ref.

0700 MCLAREN, N.W. 1983. The effect of herbicides, cultivars and fungicides on pre- and post emergence damping-off and seedling blight of sorghum (Sorghum bicolor (L) Moench). Crop Production 12: 101-103. 16 ref. (Summary:Af).

The effect of herbicides was investigated in 3 sorghum cv. at South Africa. Germination was reduced by propachlor at all rates, and by propachlor + propazine at single and double rates and by atrazine at double recommended rates. All herbicides increased seedling blight and damping off. In the combined treatments, cultivar resistance reduced and herbicides increased disease severity. Fungicides had no effect.

0701 MENGES, R.M., and GAUSMAN, H.W. 1983. Light reflectances and remote sensing detection of weeds in crops. Abstracts of 1983 Meeting of the Weed Science Society of America. pp. 31-32.

A field spectroradiometer was used to record plant canopy reflectances. Sorghum halepense was detectable with Colom-IR filum in maturing sorghum at 18 292 m.

0702 MOHAMED-SALEEM, M.A., and FAWUSI, M.O.A. 1983. A note on the effects of tropical weed decomposition on seed germination and seedling growth of some agricultural crops. Agriculture, Ecosystems and Environment 10(4): 347-352. 9 ref.

Greenhouse and laboratory experiments were carried out to evaluate the allelopathic effects of Euphorbia heterophylla, Cyperus rotundus and Digitaria sanguinalis on seed germination and seedling growth of sorghum and other crops. Signifcant reductions in germination and seedling growth of sorghum was observed when grown in pots containing increasing quantities of decomposed weeds. Decomposed Euphorbia heterophylla had the least suppressive effect on crop seeds. Seedling growth of sorghum was severely retarded when allowed to grow in leachates obtained from soil containing decomposed weeds.

0703 MOODY, K., and PAMPLONA, P.P. 1983. Weed control in intercropping. Pages 23-40 In Proceedings of the Symposium on Weed Control in Cropping Systems, 28 November-2 December 1983, Manila, Philippines. College, Laguna, Philippines: Asian Pacific Weed Science Society. 61 ref.

This literature review also covers weed control in intercropping of sorghum with legumes.

0704 NOGUCHI, K., and NAKAYAMA, K. 1983. Studies on weed control in grain sorghum. 2. Aspects of competition of weeds with grain sorghum and examination of the period for weed-free maintenance. (Ja). Weed Research (Japan) 28(2): 129-134. 7 ref. (Summary:En).

0705 PARKER, C. 1983. Herbicide antidotes - a review. Pesticide Science 14(1): 40-48. 55 ref.

The history of herbicide antidotes is reviewed. NA is found to be of potential value on sorghum and rice. Cyometrinil is used as a seed dressing for protecting sorghum against metolachlor and related herbicides. Mode of action, structure-activity relations, the current and future potential for antidotes are discussed.

0706 PAVESE, E.J. 1983. Fomesafen: a new selective herbicide for soybeans. (Es).

Malezas 11(4): 224-234.

Fomesafen when applied post emergence at 0.125-2.2 kg/ha to soyabeans did not show any residual effects in following wheat crops, but maize and sorghum sown 6 months later were affected by a rate of 0.5 kg fomesafen/ha.

0707 RAO, A.N., and DUBEY, P.S. 1983. Growth, pigment concentration and yield of sorghum cv. Vidisha as influenced by triazine herbicides. Indian Journal of Weed Science 15(1): 23-28. 10 ref.

Atrazine, cyanazine and simazine caused an increase in plant ht. of 8.9%, 7.3% and 5.8% with 0.5 kg/ha treatment and 22.9%, 18% and 15% with 1 kg/ha treatment respectively. An increase in chlorophyll content was also observed with the 3 herbicides with 0.5 and 1 kg/ha treatment. In comparison to weedy check, an increase in grain yield of 20.1%, 63.6% and 89.4% with atrazine, 15.7%, 59.8%, 40.8% with cyanazine and 25%, 57.8% and 7.8% with simazine at 0.5, 1 and 2 kg/ha dosage treatments of the respective herbicides was observed. It was concluded that atrazine, cyanazine, and simazine at 1 kg/ha dosage rate can be used as pre-emergence herbicides to control weeds and to increase sorghum variety Vidisha yields under rainfed condition.

0708 ROBINSON, E.L., and LANGDALE, G.W. 1983. Effects of herbicide and crop rotation on no-till crop production. Proceedings of the Southern Weed Science Society 36: 154. (Abstract).

Wheat and sorghum or soybeans were studied under 10 different rotations. No-tillage gave better weed control than conventional tillage. Weed control and yields were better with high herbicide treatment. Weed control was also better where the main crops alternated due to the different herbicide programmes applied.

0709 ROETH, F.W., BURNSIDE, O.C., and WICKS, G.A. 1983. Protection of grain sorghum (Sorghum bicolor) from chloroacetanilide herbicide injury. Weed Science 31(3): 373-379. 7 ref.

CGA-43089 seed treatment was evaluated for sorghum protection from injury by metolachlor, four other chloroacetanilide herbicides, and three metolachlor + s. triazine combinations. Soil incorporated metolachlor produced more consistent injury than preemergence application to unprotected sorghum, but placement did not affect CGA-43089 protection. Sorghum stand reduction was the type of injury most frequently encountered, but crop yield was least affected. CGA-43089 protected the grain sorghum from yield reduction with these herbicides.

0710 SACHER, R.M., LEE, L.F., SCHAFER, D.E., and HOWE, R.K. 1983. Synthesis and application of novel thiazoles as herbicide antidotes. Pages 165-168 In Pesticide chemistry, human welfare and the environment: proceedings of the Fifth International Congress of Pesticide Chemistry, 29 August - 4 September 1982, Kyoto, Japan (Miyamoto, J., and Kearney, P.C., eds.). Oxford, UK: Pergamon Press. 2 ref.

Safeners, 2,4-disubstituted-thiazoles to be used with alachlor in sorghum are described.

0711 SORIANO, J.D. 1983. Genetic evaluation of the ecological impact of herbicides. Pacific Science Congress Proceedings 15(1-2): 222.

(Abstract).

0712 STEPHENSON, G.R., and PALLOS, F.M. 1983. Discovery and development of antidotes to improve herbicide selectivity [sorghum]. Pages 209-212 In Pesticide chemistry, human welfare and the environment: proceedings of the Fifth International Congress of Pesticide Chemistry, 29 August-4 September 1982, Kyoto, Japan (Miyamoto, J., and Kearney, P.C., eds.). Oxford, UK: Pergamon Press.

0713 SWANN, C.W. 1983. Chemical weed control in corn and grain sorghum. Bulletin, Cooperative Extension Service, University of Georgia, College of Agriculture no. 824. 12 pp.

0714 TAYLOR, F.R. 1983. PPG 1013, a novel herbicide for broad-spectrum selective weed control at very low rates. Proceedings of the Western Society of Weed Science 36: 31-32. (Abstract).

Maize and sorghum were found tolerant to preemergence applications of PPG 1013.

0715 VAUGHN, K.C., and DUKE, S.O. 1983. In situ localization of the sites of paraquat action. Plant, Cell and Environment 6(1): 13-20. 31 ref.

Effects of paraquat were monitored by electron microscopic, cytochemical, and in vivo spectrophotometric procedures. In C4 plants including sorghum, mesophyll plastids exhibited much more peroxide deposition than was detected in bundle sheath plastids. In situ cytochrome f oxidation-reduction was followed during paraquat treatments and resulted in a hastening of the dark re-reduction of cytochrome f after only 1 h of treatment. This effect was prevented by DCMU or CeCl3. Electron transport, as measured by cytochrome f oxidation-reduction, was completely obliterated by a 24 h paraquat treatment.

0716 WARMUND, M.R. 1983. Anatomical and biochemical responses of grain sorghum (Sorghum bicolor) seedlings to flurazole and alachlor. Ph.D. thesis, University of Missouri, Columbia, Missouri, USA. 106 pp.

Alachlor and flurazole seed treatments did not affect germination but inhibited early root growth. Root tissue examined by scanning electron microscopy was not morphologically altered but root development was retarded. The rate of respiration and pyruvate oxidation was also decreased by the alachlor + flurazole treatment. Retardation of the mobilization of seed energy reserves and the decreased rate of metabolic processes caused by flurazole may allow herbicide detoxification when the seedling is susceptible to herbicide injury.

0717 WIESE, A.F., PETR, F.C., and CHENAULT, E.W. 1983. An aerial method of estimating crop losses from weeds. Abstracts of 1983 Meetings of the Weed Science Society of America. pp. 13-14.

In surveys av. loss in grain yield of sorghum from pigweed infestation was 34%, from Echinochloa crus-galli and other annual grasses 31%, from Sorghum halepense 48% and from shattercane (Sorghum bicolor) 48%. Aerial surveying just before sorghum harvest showed that weeds could be identified best by flying at 150 m above the ground.

0718 WILKINSON, R.E. 1983. Gibberellin precursor biosynthesis inhibition by EPTC and reversal by R-25788. Pesticide Biochemistry and Physiology 19(3): 321-329. 55 ref.

S-ethyl dipropylthiocarbamate (EPTC) inhibited GA precursor biosynthesis in a cell-free enzyme preparation from unruptured, etiolated sorghum coleoptiles. EPTC, 1 micro M, inhibited incorporation of [14C] mevalonic acid into kaurene 60%, while 10 micro M EPTC inhibited 14C incorporation into kaurene 90%. The precursor of kaurene cyclization (GGPP) increased in 14C content at both EPTC concentrations. R-25788 reversed the EPTC inhibition of kaurene synthesis. Kaurene oxidation was modified by both EPTC and R-25788. Hypothesized modes of action for EPTC and R-25788 are (a) inhibition of GA synthesis, (b) increased peroxidase activity resulting in increased lignification, (c) increased detoxification by sulfoxidation and carbamoylation, and (d) inhibition of fatty acid synthesis and/or desaturation.

Harvesting

0719 BELLE, V.C., and HOSMANI, M.M. 1983. Effect of time and method of harvesting on yield and seed quality of sorghum. Indian Journal of Agronomy 28(2): 197-198. 3 ref.

A field experiment was carried out during kharif season at Dharwad, India on Vertisols. Seeds were sown on 21 June 1979 with 30 and 15 cm row and plant spacing, respectively. There were 16 treatments comprising 8 different times of harvesting and 2 methods of harvesting. The seed yield was the highest 115 days after sowing. The germination of fresh and dry seeds improved significantly for those harvested from 90-110 days after sowing and further harvesting did not improve the germination.

0720 BROWN, R.F. 1983. Sorghum black layer: a valuable visual aid for harvesting. World Farming 25(3): 14, 16.

A black layer develops at the pointed end when sorghum seeds reach their maximum size due to tube blockage. Its recognition is useful in obtaining maximum yields. It prevents wastage of irrigation water and indicates optimal harvest time in case of premature grain maturity due to water stress.

0721 YEN, C.C., and YANG, C.H. 1983. Modification and improvement of rice combine into sorghum combine [Taiwan]. (Ch). Journal of Agricultural Research of China 32(1): 92-104. 6 ref. (Summary:En).

The modified machine components are described. The machine has the ability of sorghum harvesting capacity of 0.8 to 1.5 ha/day, grain flow capacity: 1,060 kgs/ha, field eficiency: 78% to 82%.

0722 YOSHIHARA, T., MASUDA, J., and INOUE, K. 1983. Development of a small-sized row-crop forage harvester. (Ja). Bulletin of the National Grassland Research Institute 25: 89-95. 6 ref. (Summary:En).

A small-sized row-crop forage harvester was developed, and its characteristics and adaptability were investigated for its suitability for maize and sorghum to store as silage on small-scale farms and small fields. The performances of cutting, chopping and throwing were found satisfactory.

DISEASES, PESTS, AND THEIR CONTROL

0723 BONZI, S.M. 1983.

Survey of the traditional methods of plant protection and activities of observation posts. (Fr). Pages 55-66 In Commission Technique des Productions Vivrieres et Oleagineuses. Cellule Defense des Cultures Projet lutte integree Mali. Resultats Campagnes 1982-1983, Entomologie (Doumbia, Y.O., Sidibe, B., Toure, K., and Bonzi, M.S.). Bamako, Mali: Institut d'Economie Rurale. (Document no. 6).

0724 COMITE PERMANENT INTERETATS DE LUTTE CONTRE LA SECHERESSE DANS LE SAHEL. 1983. Report on the First Meeting of Working Groups of the Integrated Pest Management Project of CILSS, 28 February-4 March 1983, Institut du Sahel, Bamako, Mali. (Fr).

0725 GOUD, J.V., ANAHOSUR, K.H., and KULKARNI, K.A. 1983. Breeding for multiple resistance in sorghum. Page 3 In National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Coimbatore, Tamil Nadu, India. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

Resistance to fungal diseases was inherited independently and resistance to shootfly was polygenically controlled.

0726 HACKEROTT, H.L., MARTIN, T.J., and HARVEY, T.L. 1983. Breeding for resistance to greenbug, chinch bug, and maize dwarf mosaic in sorghum. Report of Annual Corn and Sorghum Research Conference 38: 11-27. 34 ref.

New sources of resistance to biotype E greenbug, identification of diverse sources of chinch bug resistance, discovery of a new source of immunity to MDMV-A and B, and a variant of MDMV are reported.

0727 ICRISAT. 1983. Plant quarantine. Pages 399-403 In Annual report 1982. Patancheru, Andhra Pradesh, India: ICRISAT.

In this chapter of the report, information on export of plant material, import of plant material and postentry quarantine of sorghum and other mandate crops of ICRISAT is presented.

0728 NIMBALKAR, V.S., BHARUD, R.W., and BAPAT, D.R. 1983. Reaction of the new varieties of the winter sorghum to shootfly, stem borer and loose kernel smut (Sphacelotheca cruenta (Kuhn) Potter) under dry land condition. Sorghum Newsletter 26: 31.

Incidence of shootfly ranged from 1.00 to 2.29%. Most of the varieties were resistant and entries HS-4 bulk, HS-13, MTML-G-5, and PVR-1-6 were moderately resistant. Incidence of stem borer was low. The entries M-35-1 x GM-1-5-27-2, PVR-1-1, RSV-15R, RSV-4R, and RSV-5R were observed to be free from attack. Only RSV-4R and SPV-86 were affected by loose kernel smut. The entries RSV-2R, RSV-5R, RSV-10R, RSV-11R, RSV-12R, RSV-15R, CSH-8R, MRP-511, 1258B X SPV-86-11, HS-13-MTML 4-5, PVR-1-6, MRP-5-13, PVR-1-1, and M 35-1 x GM 1-5-27-2 were free from the disease.

0729 SCHUMACHER, E.G. 1983. Pesticides in China. Chemistry and Industry 12: 460-462.

Major pests, diseases and weeds of crops including sorghum, and production and use of pesticides and plant growth regulators in China are discussed.

Pathology

0730 AHMED AZIZ, A.A. 1983.

Field and laboratory screening of sorghum (Sorghum bicolor (L.) Moench) genotypes for seed deterioration. Ph.D. thesis, Mississippi State University, Mississippi, USA. 159 pp.

Moisture content, 1000-kernel weight, standard germination, percent viviparity and field emergence were used to evaluate seeds for field deterioration. The physical and physiological quality of seed declined as time of field exposure increased. Few cultivars showed the lowest percentage of decline with regard to all measurements for different tests. Fungal invasion began prior to physiological maturity. Alternaria spp. were predominant on freshly harvested seed, while Fusarium spp. predominated at later harvests. The rate of seed drying in the field for resistant and susceptible cv. showed differences as the seed declined from 30 to 20% moisture. The resistant cv. survived in storage for longer time intervals even at very high humidity. The misting system proved successful for evaluating sorghum cv. for their field weathering resistance potential.

0731 DOUPNIK, B., JR., and FREDERIKSEN, R.A. 1983. Diseases of major crops. Pages 525-534 In Dryland agriculture (Dregne, H.E., and Willis, W.O., eds.). Madison, Wisconsin, USA: American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America. 16 ref.

Diseases of wheat, corn, sorghum, alfalfa and cotton in North America are described.

0732 FATTAH, M.A. 1983. Plant pathology [sorghum; kenaf, rice; soybean. Seed-borne diseases survey at Kenana, Sudan]. Pages 42-49 In Annual report, 1978-1979. Kenana, Sudan: Kenana Research Station.

0733 HERNANDEZ MARTINEZ, M., and BETANCOURT VALLEJO, A. 1983. Reaction of sorghum lines from the IDIN (International Disease and Insect Nursery) at El Bajio, Mexico. Sorghum Newsletter 26: 119.

Thirty-two lines of the IDIN were evaluated at 2 locations in Mexico. The best sources of resistance to leaf blight were SCO 326-6 and R 6956. At both locations the lines VG 146, R 5388, R 6956, TX 2775 and MBC 13-1-1-bk-bk-bk had best overall desirability. All lines except BTx 378 and 77 CS1 expressed good resistance to sorghum downy mildew.

0734 LOUVEL, R. 1983. Annual report of sorghum pathology in Senegal 1982. (Fr). Bambey, Senegal: Ministere du Developpement Rural. 6 pp.

0735 VUONG, H.H., and TRAORE, M. 1983. Phytopathology of sorghum. (Fr). Pages 27-42 In Commission Technique des Productions Vivrieres et Oleagineuses. Cellule Defense des Cultures Projet lutte integree Mali. Phytopathologie, resultats campagne 1982-1983 (Vuong, H.H., and Traore, M.). Bamako, Mali: Institut d'Economie Rurale. (Document no. 6-1).

Fungal Diseases

0736 BALASUBRAMANIAN, K.A., and REDDY, T.B. 1983. Pattern of distribution of ethylene bisdithiocarbamate residues in certain cereals, vegetables, oilseed and fruits in the semi-arid tropics. Page 681 In Proceedings of the Tenth International Congress of Plant Protection, 20-25 November 1983, Brighton, UK. v.2. Croydon,

UK: British Crop Protection Council. (Abstract).

Among the cereals tested wheat grain and wheat straws had the lowest concentration of maneb and zineb, while sorghum grain and sorghum straw contained the highest residues

0737 CHANDRASEKARAN, A., PALANISAMY, S., and PRASAD, M.N. 1983. Sorghum disease studies in India. Sorghum Newsletter 26: 107-108.

The susceptible and resistant genotypes are identified in different screening trials at Coimbatore, India for resistance to molds, sugary disease, rust, and downy mildew. Seed treated by the slurry method with DDT + TMTD + APRON had the highest per cent germination in pot and field tests when compared to nontreated seed or other treatments.

0738 CRESPO, L.B., and FORBES, G. 1983. Sorghum wilt caused by (Acremonium strictum Gams.) in Argentina. Sorghum Newsleter 26: 105. 2 ref.

Acremonium strictum is a weak pathogen in sorghum and a natural soil inhabitant, and although it may be widely spread in the crop, it seems to be of minor importance in Argentina.

0739 DUNCAN, R.R. 1983. The anthracnose-fusarium disease complex on sorghum in the southeastern U.S.A. Sorghum Newsletter 26: 121-122.

Fusarium predominated when short duration cycles of rain and drought occurred throughout the growing season. Fusarium attacked the leaves and stems, the peduncle and panicle and the grain during development. Anthracnose was more prevalent when rains were consistent throughout growth and development, or when the plants were irrigated with sprinkler-applied water. The organism attacked the leaves, culms, penduncle, the panicle and the grain. Improved genotypes with resistance to fusarium and anthracnose are identified by field trials at Georgia, USA.

0740 ESELE, J.P.E. 1983. Sorghum and finger millet disease problems in Uganda. Page 936 In Proceedings of the Tenth International Congress of Plant Protection, 20-25 November 1983, Brighton, UK. v. 3. Croydon, UK: British Crop Protection Council. 3 ref. (Abstract).

The studies revealed sorghum anthracnose (Colletotrichum graminicola) as the most important foliar disease. Downy mildew, grey leaf spot, leaf rust and leaf blight were the other important foliar diseases. Grain molds were most important on the heads. These diseases had a serious impact on the crop economy in Uganda.

0741 FAHIM, M.M, ATTIA, M.F., BARAKAT, F.M., and ALY, H.Y. 1983. Influence of storage conditions on sorghum grains and the associated fungi. Pages 187-200 In Proceedings of the Fifth Conference on Microbiology, May 1983, Cairo, Egypt. v. 3. Plant pathology. Cairo, Egypt: Egyptian Society of Applied Microbiology. (Summary:Ar).

The most prevalent species of fungi during storage were those belonging to the genera Aspergillus, Alternaria, Drechslera and Fusarium. Temperature and humidity during grain storage markedly affected the development of the associated pathogenic fungi. Grains stored at higher levels of relative humidity and temperature for 6 months were entirely invaded

and lost completely their germinability, while those stored at lower relative humidity (65%) and temperature (10 deg C) were slightly affected.

0742 FORBES, G., and CRESPO, L.B. 1983. Sorghum wilt, Acremonium strictum Gams. (Es). Informacion Agropecuaria 5(29): 42-44. 12 ref.

0743 KUSHWAHA, U.S., and UPADHYAY, V.K. 1983. A.I.C.S.I.R.P. Indore information for Sorghum Newsletter. Sorghum Newsletter 26: 112.

In a survey conducted in Madhya Pradesh, India the most common diseases recorded were anthracnose, sooty stripe and leaf blight on local varieties and CSH-5 and CSH-6 sorghum. Sorghum downy mildew occurred on local varieties and Vidisha 60-1.

0744 LOUVEL, D. 1983. Sorghum pathology. Seedling vigour and grain mycoflora. Bibliographical review. (Fr). Bambey, Senegal: Centre Nationale de Recherches Agronomiques. 16 pp. 77 ref.

0745 REED, J.E., PARTRIDGE, J.E., and NORDQUIST, P.T. 1983. Fungal colonization of stalks and roots of grain sorghum during the growing season. Plant Disease 67(4): 417-420. 14 ref.

Fungi were isolated with increasing frequency from anthesis through the grain-filling period. Fusarium moniliforme was the predominant species recovered from stalks. Several other Fusarium spp. were also found along with Alternaria spp. and Nigrospora spp. The fungi most commonly isolated from roots were F. equiseti, Trichoderma spp., and Alternaria spp. A similar sequence of colonization was observed in stalk tissue during the two seasons. Roots also appeared to be colonized by fungi in a pronounced sequence.

0746 SHARMA, H.C. 1983. A technique for identifying and rating resistance to foliar diseases of sorghum under field conditions. Proceedings of the Indian Academy of Sciences, Section B 92(3): 271-278. 3 ref.

A susceptibility ratio for identifying and rating resistance is suggested and compared with the present method under natural conditions of infection in the field. This ratio brings out relative resistance as susceptibility of a test variety; the advantage is that rating for each variety remains stable under varied conditions of natural infection. According to the suggested system susceptibility ratios of 0.14 and 0.35 are regarded as resistant and moderately resistant respectively. Four models of visual resistance scale are prepared to directly denote susceptible, resistant and moderately resistant reactions under different disease pressures.

0747 SOWELL, G., JR. 1983. Fungi causing reduced germination of sorghum PI's in Georgia. Phytopathology 73(5): 805. (Abstract).

Approximately 700 samples of sorghum seed of plant introductions (PI's) were germinated on moist blotters under 12 hours of fluorescent light per day for one wk. Ten of the PI's germinated poorly and Fusarium moniliformae grew from most of the seed of these. Seed of RTX2536 inoculated at 50% bloom with Fusarium moniliformae and incubated for 48 hrs in a moist chamber failed to germinate. All PI's with <17% germination were dipped in 70% ethanol and treated with 0.5% NaOCl

for 5 min. This treatment increased germination to 35-100% except for PI 246697. Curvularia geniculata, C. lunata, C. intermedia, Helminthosporium spicifera, and H. turcicum were isolated from a few seed of many PI's. They reduced germination of seed from inoculated plants to 0-16%. Helminthosporium rostratum was isolated but was not pathogenic. Collectotrichum graminicola was isolated and its pathogenicity was not tested.

0748 ZIV, O., and FREDERIKSEN, R.A. 1983. Control of foliar diseases with epidermal coating materials. Plant Disease 67(2): 212-214. 26 ref.

Several waxes and plastic polymers were evaluated as protectants from foliar pathogens on maize, sorghum, and wheat. These products reduced anthracnose, leaf blight, rust, downy mildew, and powdery mildew in varying amounts. The potential of these products for disease control is reviewed and discussed.

Smuts

0749 CHOUDHARI, S.D., KULKARNI, L.P., and TIKOTKAR, A.B. 1983. Control of leaf sugary disease of sorghum by chemical sprays. Sorghum Newsletter 26: 115.

To control leaf sugary disease, 5 chemicals and a water and no spray control chemicals were evaluated. No chemical reduced the percentage of plants affected by leaf sugary disease. However, the disease intensity was reduced by application of 2-4-D and Kaolin (6%).

0750 HERNANDEZ MARTINEZ, M., NARRO SANCHEZ, J., and BETANCOURT VALLEJO, A. 1983. Races of head smut (Sphacelotheca reiliana Kuhn Clint) at the Bajio of Guanajuato and Michoacan, Mexico. Sorghum Newsletter 26: 118.

Six hybrids and 4 lines of sorghum were evaluated in 2 trials at Mexico to study the variability of Sphacelotheca reiliana. All 3 races were present and race 2 was less common in the area. Among the genotypes tested 1 to 3% were infection resistant, 4-6% moderately resistant and more than 7% were susceptible.

0751 KULKARNI, L.P., CHOUDHARI, S.D., and TIKOTKAR, A.B. 1983. Control of leaf sugary disease of sorghum by spraying 2-4D. Sorghum Newsletter 26: 116.

An experiment was conducted to determine a concentration of 2-4D effective in control of leaf sugary disease of sorghum. It was found that the disease was significantly reduced by spraying 2-4D at the rate of 25 and 50 ppm when compared to the control.

0752 RAJKULE, P.N., DESAI, K.B., KADAM, J.R., and CHAUHAN, G.H. 1983. Reaction of the sorghum genotypes to sugary disease. Sorghum Newsletter 26: 114.

The study revealed that though sugary infestation was severe in the July planting entries SPV-126 and SPV-232 were completely free from the disease, and entry SPV-232 also remained disease free in the August planting. The most resistant entries to sugary disease for one or both planting dates were SPV-232, SPV-126, SPH-196, SPV-313 and SPV-398.

Rust

0753 INDIRA, S., RANA, B.S.,

RAO, V.J.M., and RAO, N.G.P. 1983. Host plant resistance to rust in sorghum. Indian Journal of Genetics and Plant Breeding 43(2): 193-199. 11 ref.

Four experiments were conducted to determine the stability of varietal resistance and dominance of rust reaction in F1 hybrids under different genetic and cytoplasmic backgrounds. All the tan pigmented varieties and hybrids were not resistant to rust. CSV-4 and SPV-312 were tan (T) parents highly resistant and stable in rust reaction over environments. Male sterile and B-lines were moderately susceptible. Purple (P) pigmented parents transmitted susceptibility as dominant character. Incomplete dominance of resistance was observed in some of the T x T crosses where one of the parent was highly resistant. The T x T hybrids were relatively more resistant than T x P or P x P crosses. Partial dominance mechanism of resistance observed in some T x T crosses could be useful to develop commercial hybrids.

Downy Mildews

0754 ANAHOSUR, K.H., and PATIL, S.H. 1983. Effective spray schedule of metalaxyl (25 WP) for the sorghum downy mildew therapy. Indian Phytopathology 36(3): 465-468. 8 ref.

Metalaxyl @ 2g.a.i./L sprayed at 10, 40, 20, and 50 days after emergence resulted in complete therapy of the systemic infection of downy mildew in sorghum and helped to realise more yields.

0755 BHAT, S.S., RENFRO, B.L., and NARONG SINGBURAUDOM. 1983. A simple technique for aseptic conidial isolation of Peronosclerospora sorghi. Journal of Thai Phytopathological Society 3(1): 14-16.

0756 BONDE, M.R., and PETERSON, G.L. 1983. Comparison of host ranges of Peronosclerospora philippinensis and P. sacchari. Phytopathology 73(6): 875-878. 14 ref.

Seventy-two plant species were tested for susceptibility to systemic colonization after conidial inoculation with two isolates of Peronosclerospora philippinensis from the Philippines. All susceptible species were members of the tribe Andropogoneae. Three species of sorghum were susceptible. Not all accessions susceptible to one isolate of the pathogen showed systemic symptoms when inoculated with the second isolate. A very close phylogenetic relationship between P. philippinensis and P. sacchari was indicated.

0757 BONDE, M.R., and PETERSON, G.L. 1983. Importance of host range studies in taxonomy of Peronosclerospora fungi. Phytopathology 73(6): 964. (Abstract).

0758 CRAIG, J. 1983. Consistent infection of corn seedlings with oospores of Peronosclerospora sorghi. Phytopathology 73(8): 1177-1179. 18 ref.

Oospores of Peronosclerospora sorghi were produced in leaves of infected sorghum plants in the greenhouse. The leaves were harvested 5-6 wk after the plants were inoculated with conidia, dried at 35 deg C, and stored at 5 deg C. The dried leaves were shredded in a Waring blender and mixed with potting soil. Seeds of corn and sorghum were planted in the infested soil. The oospore

inoculum consistently induced high incidences of sorghum downy mildew in susceptible corn genotypes, but was much less effective in tests with susceptible sorghum genotypes.

0759 CRAIG, J. 1983. Pathotype 3 of Peronosclerospora sorghi. Miscellaneous Publication, Texas Agricultural Experiment Station 1535: 5.

Downy mildew pathotype 3 is identified as a serious threat to sorghum production in South Texas, as it is pathogenic to line Tx 430 and its derivatives. Out of 38 sorghum hybrids resistant to pathotypes 1 and 2 tested for reactions to pathotype 3, 36 hybrids were susceptible to the new pathotype.

0760 CRAIG, J., and FREDERIKSEN, R.A. 1983. Differential sporulation of pathotypes of Peronosclerospora sorghi on inoculated sorghum. Plant Disease 67(3): 278-279. 8 ref.

A system was devised for differentiating pathotypes of Peronosclerospora sorghi according to their ability to sporulate on inoculated leaves of differential sorghum genotypes. In 1980, a new pathotype (pathotype 3) was discovered in Texas among populations of P. sorghi that sporulates on lines Tx412, Tx430, and CS3541 but not on QL3.

0761 CRAIG, J., and FREDERIKSEN, R.A. 1983. Effect of light on the reaction of sorghum to Peronosclerospora sorghi. Phytopathology 73(5): 803. (Abstract).

Sorghum seedlings were inoculated with conidia of P. sorghi and grown in environmental chambers at 25 deg C and high and low light intensities. The incidence of downy mildew at 21 days after inoculation was 14% in the high light treatment and 45% in the low light treatment. The difference between disease incidences was highly significant (P=0.01).

0762 FERNANDES, F.T., and SCHAFFERT, R.E. 1983. The reaction of several sorghum cultivars to a new race of sorghum downy mildew (Peronosclerospora sorghi) in southern Brazil in 1982-1983. Agronomy Abstracts. p. 63.

A trial of 17 maize cultivars and 29 sorghum cultivars planted in 1983 in Palotina, Brazil confirmed the probability of a new race of sorghum downy mildew in Brazil. Many of the cultivars resistant to the old race of P. sorghi continue resistant to the new race.

0763 FRANCIS, S.M., and WILLIAMS, R.J. 1983. Peronosclerospora sorghi. CMI Descriptions of Pathogenic Fungi and Bacteria 77(761): 1-2. 3 ref.

0764 FREDERIKSEN, R.A. 1983. Sorghum downy mildew in Texas, a brief history. Miscellaneous Publication, Texas Agricultural Experiment Station 1535: 6. 1 ref.

Downy mildew became an economically important disease in 1967 in Texas, USA. Through 1978, only one race of pathogen was known. In 1978 a new variant of Peronosclerospora sorghi designated as pathotype 2, was reported causing high incidence of the disease on downy mildew resistant hybrids. In 1980, pathotype 3 was described which could attack most of the popular sources of resistance to downy mildew.

0765 FREDERIKSEN, R.A. 1983. Sorghum downy mildew. Phytopathology 73(5): 782. (Abstract).

Sorghum downy mildew

(Peronosclerospora sorghi) is one of the tropical downy mildews that has spread to most of the major maize or sorghum growing regions of the world. While the pathogen spread to many states of USA economically damaging, levels of the disease remained localized to the Gulf Coast region of Texas. The initial control strategy included both cultural and host resistance, which essentially eliminated losses within the endemic areas. Variation in pathogenicity prompted further research on the deployment of host resistance with integrated control. Metalaxyl labeled as a seed dressing in 1983 could further reduce potential losses by sorghum downy mildew. While periodic monitoring for variability in the pathogen and its distribution are needed, cultural and genetic controls appear to have eliminated sorghum downy mildew as a threatening disease of maize and sorghum in the USA.

0766 FREDERIKSEN, R.A. ED. 1983. Integrated control of sorghum downy mildew: proceedings of the Downy Mildew Workshop, 1982, College Station, Texas, USA. Miscellaneous Publication, Texas Agricultural Experiment Station no. 1535. 15 pp.

The publication includes 7 short articles on implications and control strategies of new pathotypes of Peronosclerospora sorghi.

0767 HARSTON, W.G. 1983. Chemical control - a reality in 1983? Miscellaneous Publication, Texas Agricultural Experiment Station 1535: 12.

The possibility of the registration of APRON as a seed treatment on sorghums in Texas, USA is discussed. APRON is found to be more economical, as it is also a highly effective control for Pythium. Though the expected cost of treated seed with APRON is higher than Captan, the cost per acre could be reasonable, due to the potential return per acre.

0768 HORNE, C.W. 1983. Evaluation of commercial hybrids. Miscellaneous Publication, Texas Agricultural Experiment Station 1535: 13.

The Texas Agricultural Extension Service with the collaboration of the Texas Agricultural Experiment Station have evaluated some commercial hybrids for disease reaction. Instructions are given to seed companies for using this information to develop more resistant hybrids.

0769 JANKE, G.D., PRATT, R.G., ARNOLD, J.D., and ODVODY, G.N. 1983. Effects of deep tillage and roguing of diseased plants on oospore populations of Peronosclerospora sorghi in soil and on incidence of downy mildew in grain sorghum. Phytopathology 73(12): 1674-1678. 14 ref.

Roguing was conducted to simulate effects of 1- to 3-yr rotations with resistant crops by preventing completion of the disease cycle and addition of new inoculum to soil. Deep tillage was most effective when ploughing was conducted in a downwind direction and not preceded by deep disking. It is concluded that deep tillage, when properly conducted, and crop rotations or other treatments that prevent addition of new oospores to soil for 3 yr may provide economically beneficial control of sorghum downy mildew.

0770 LI, M.Y. 1983. On a sorghum and corn disease sorghum downy mildew in the Yemen Arab Republic. (Ch). Acta Phytopathologica Sinica 13(2):

31-40. 4 ref. (Summary:En).

The spread of the systemic infection of Sclerospora sorghi was studied. The weather conditions causing an epidemic were daily mean temp. 25-29 deg C, relative humidity more than 56%, monthly dew period more than 18 days, and monthly rainfall more than 30 mm. Distinct differences in varietal resistance was also studied.

0771 MILLER, F.R. 1983. Sorghum downy mildew. Miscellaneous Publication, Texas Agricultural Experiment Station 1535: 7.

A calculated course of action is recommended to educate growers in Texas, USA that crop rotation, fungicides, and cultural practices must be used to help conserve the sources of downy mildew resistance. Some breeding materials screened by Dr. J. Craig in the Sorghum Conversion Program are listed.

0772 MUGHOGHO, L.K. 1983. Control of sorghum downy mildew in India and Africa. Presented at the International Working Group on Graminaceous Downy Mildews, Fourth International Congress of Plant Pathology, 17-24 August 1983, University of Melbourne, Melbourne, Australia. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0773 NARRO SANCHEZ, J., HERNANDEZ MARTINEZ, M., and BETANCOURT VALLEJO, A. 1983. Reaction of commercial sorghum hybrids to conidial infection of downy mildew (Peronosclerospora sorghi). Sorghum Newsletter 26: 117-118. 2 ref.

The study of 72 hybrids in Mexico for their reaction to the foliar infection revealed that 3% of the hybrids showed more than 10% of infection, 50% of the hybrids showed 6-10% infection, 10% of the hybrids showed 3-5%, and 33% of the hybrids showed less than 2% of conidial infection.

0774 ODVODY, G.N. 1983. Cultural and chemical control [sorghum downy mildew]. Miscellaneous Publication, Texas Agricultural Experiment Station 1535: 10-11. 4 ref.

Cultural controls like deep ploughing and crop rotation reduced sorghum downy mildew incidence in Texas, USA. Known mycoparasites of oospores could be potential biological control agents. Metalaxyl was the most effective systemic fungicide when used on sorghum downy mildew resistant hybrids at seed treatment rates of 1.0 g ai/kg. Forsetyl-Al was found consistent in its performance, but high rates were necessary for control.

0775 ODVODY, G.N., FREDERIKSEN, R.A., and CRAIG, J. 1983. The integrated control of downy mildew. Report of Annual Corn and Sorghum Research Conference 38: 29-36. 24 ref.

The disease symptoms, occurrence, distribution, etiology of SDM and ecology of Sclerospora sorghi are discussed. The integrated use of fungicides, host plant resistance, cultural and biological control is suggested as the best approach to control downy mildew of sorghum at Texas, USA.

0776 PRABHU, M.S.C., SAFEEULLA, K.M., and SHETTY, H.S. 1983. Penetration and establishment of downy mildew mycelium in sorghum seeds and its transmission. Proceedings of the Indian National Science Academy, Part B 49(5): 459-465. 19 ref.

Peronoscelerospora sorghi establishes in sorghum seeds either directly from the mother plant or

by conidial infection through stigma, style and ovary. Infection through the mother plants leads to various degrees of earhead sterility whereas the conidial infection through carpels does not induce any sterility in the earhead. Infection can take place only during stigma emergence stage and mycelial infection is noticed in pericarp and aleurone layer in about 30% of the seeds. The fungus established in the embryonic tissue only in 0.5% of the seeds. In the transmission studies, direct correlation is noticed between embryo infection and seed transmission of the fungus.

0777 ROSENOW, D.T. 1983. Sources of resistance to pathotype 3 of Peronosclerospora sorghi. Miscellaneous Publication, Texas Agricultural Experiment Station 1535: 8-9.

Three sorghums were tested at Texas, USA to provide information on reaction to secondary evaluation and on the incidence of systemic disease. Zera zera sorghums, SC 108, SC 109, SC 170, and SC 173 were found highly susceptible to downy mildew pathotype 3. Caudatum sorghums SC 414, SC 93, SC 708, and SC 727 were highly resistant to pathotype 3.

Leaf Spot/Blight

0778 BORGES, O.L. 1983. Pathogenicity of Drechslera sorghicola isolates on sorghum in Venezuela. Plant Disease 67(9): 996-997. 8 ref.

Drechslera sorghicola was identified as the causal organism of leaf spot of sorghum. The fungus produced well-defined and elongated spots, which varied in size and colour according to the sorghum genotype. The disease is of economic importance in regions where high humidity and favorable temperatures occur during the growing season.

0779 DALMACIO, S.C., DAYAN, M.P., and PASCUAL, C.B. 1983. Identification of sources of resistance to some major diseases of sorghum in the Philippines. Phillippine Phytopathology 17(1-2): 38-46. 11 ref.

Sorghum was screened for resistance to leaf spots, leaf rust, and Rhizoctonia sheath blight by the use of inoculation methods. Field screening was affected by interference among foliar diseases, plant height and maturity.

0780 GALIBA, M. 1983. Inheritance of resistance to sooty stripe disease. Sorghum Newsletter 26: 120.

Study indicated that the resistance to Ramulispora sorghi is governed by a single recessive major gene.

0781 GORBET, D.W. 1983. Anthracnose evaluations on selected sorghums in North Florida. Sorghum Newsletter 26: 121.

Commercial grain sorghum hybrids, experimental test crosses, and breeding lines were evaluated for anthracnose resistance at Florida, USA. The commercial hybrids were among the more resistant entries tested. More infection was evident in July planting. The parental lines presented a range of susceptibility.

0782 KHAN, S.A., HAMEED, K.M., and DAMIRDAGH, I.S. 1983. Three unreported parasitic fungi from northern Iraq. Nova Hedwigia 37(2-3): 361-367. 7 ref.

Cladosporium macrocarpum causing

leaf spot in sorghum is described.

0783 MATHUR, K., and NAIK, S.M.P. 1983. Field evaluation of advanced sorghum varieties against leafspot diseases. Sorghum Newsletter 26: 116-117. 2 ref.

Field trials were conducted in Rajasthan, India for reaction of 15 advanced sorghum varieties to Helminthosporium turcicum, Colletotrichum graminicola, Ramulispora sorghi and Gloeocercospora sorghi. All varieties were infected with 1 or more of the diseases and differed in resistance.

0784 PALLISBO, M.B., and FRANJE, N.S. 1983. The economic evaluation of commercial fungicides for the control of Helminthosporium leaf spot of sorghum. CMU Journal of Agriculture, Food and Nutrition 5(3): 655-665. 15 ref.

0785 SHANKERLINGAM, S., and BALASUBRAMANIAN, K.A. 1983. A simple method to induce sporulation in Helminthosporium turcicum incitant of leaf blight of maize. Current Science 52(18): 880-881. 4 ref.

The fungus was grown on different media containing extracts of grains of maize, sorghum, barley, wheat and extracts of leaves of highly susceptible maize cv. Two isolates of fungus were inoculated in media in petri dishes from 6 day old cultures grown on Potato Dextrose Agar. The petri dishes were incubated at 25 deg C for 15 days. Each treatment was repeated 3 times. The sporulation was estimated using a haemocytometer. The highest number of spores were observed on the medium containing maize leaf extract increasing the sporulation significantly of the 2 isolates, than on the conventional Potato Dextrose Agar medium.

0786 SHENOI, M.M., and RAMALINGAM, A. 1983. Leaf blight of sorghum: influence of meteorologial factors and crop growth stages on the spread of inoculum and disease. Indian Phytopathology 36(4): 700-706. 11 ref.

Sorghum leaves bearing stage-3 type spots of leaf blight caused by Exserohilum turcicum produced 6.820 and 3,880 conidia/sq. cm from the upper and lower surfaces of leaf respectively when incubated at high R.H. At 80 per cent R.H. and below conidia were not produced. Nearly 70 per cent of the air-borne conidia of E. turcicum were trapped in the daytime hours when R.H. was 50-69 per cent and temp. 26-28 deg C. While R.H. was identified as an important factor for the build up of inoculum in the field, the coincidence of post flowering stages with it were found to be responsible for the spread of the disease in epidemic proportions.

0787 SHREE, M.P. 1983. Efficacy of a few fungicides against the incidence of leaf blight of jowar. Pesticides 17(10): 27-29. 4 ref.

In vitro and in vivo fungicide tests against Exserohilum turcicum on sorghum was studied. Bangtan and Difolatan were most effective followed by Morestan and Dithane M-45. In studies with hybrid sorghum, Pancotine was found superior to others.

0788 SHREE, M.P. 1983. Seedling and leaf blight of jowar by seed-isolated Exserohilum and Drechslera species. Current Science 52(15): 728-730. 2 ref.

Effect of seed-borne fungi on the germination of seeds of 4 cv. of sorghum was studied by the test tube agar seedling symptom test. All the 11 fungi tested reduced the percentage of seed germination.

They proved to be pathogenic but exhibited differences in virulence. Hybrids were resistant to most of the test fungi while the varieties were susceptible to varying degrees.

0789 SHREE, M.P., and LUKE, P. 1983. Inability of Exserohilum turcicum (Pass.) Leo. et Sug., to survive as a saprophyte in soil in situ. Plant and Soil 74(1): 141-144. 8 ref.

A study of the capacity of Exserohilum turcicum to survive in sorghum field soil gave negative results, proving its inability to survive saprophytically in soil. That alternate graminaceous hosts and low seed-borne nature of the fungus might be involved in causing the seedling blight has been indicated.

0790 SIDDIQUI, M.R., MATHUR, S.B., and NEERGAARD, R. 1983. Longevity and pathogenicity of Colletotrichum spp. in seed stored at 5 degrees C. Seed Science and Technology 11(2): 353-361. 17 ref.

Collectotrichum dematium survived for over 8 years in seeds of chilli and for over 10 years in mungbean and soybean while C. graminicola survived for 5 and 7 years in mungbean and sorghum. Component plating of chilli, soybean, mungbean and sorghum seeds from these samples revealed Colletotrichum infection in the embryo, suggesting that the inoculum survived due to its deep seated location. Cultures of these species from surviving inoculum of different ages proved pathogenic. The risk involved in using diseased seed from gene banks is discussed.

0791 SIDHU, G.S. 1983. Genetics of Gibberella fujikuroi. II. Natural occurrence and significance of heterokaryosis in sorghum isolates. Canadian Journal of Botany 61(12): 3314-3319. 17 ref. (Summary:Fr).

The homokaryotic components of the most frequently recovered heterokaryons at a given growth stage were identified by colony colour, texture, growth rate and sporulation. The occurrence of different heterokaryons at different growth stages suggests genetic adaptation and a possible role of heterokaryosis in generating and maintaining natural variability in this fungus.

0792 SOMCHAI THASINGSA. 1983. Studies on morphology, physiology, pathogenicity and seed transmission of Colletotrichum graminicola (Ces.) Wils and Colletotrichum gloeosporiaides (Penz.) Sacc., seed-borne fungi of sorghum seed (Sorghum bicolor (L.) Moench) variety Hegari collected from Thailand. (Thai). M.S. thesis, Kasetsart University, Bangkok, Thailand. 123 pp. 67 ref. (Summary:En).

0793 WALL, G.C., ODVODY, G.N., and FREDERIKSEN, R.A. 1983. A field inoculation technique for Cercospora sorghi on sorghum. Phytopathology 73(3): 507. (Abstract).

The technique involves inoculating plants before booting in the evening with 35,000 conidia/ml using an ultra low volume applicator. Resistant and susceptible reactions could be readily distinguished by this technique.

Rots

0794 ANAHOSUR, K.H. 1983. Comparison of the toothpick and sick plot methods on the incidence of charcoal rot in sorghum. Sorghum

Newsletter 26: 108-109. 1 ref.

The per cent charcoal rot caused by Macrophomina phaseolina was almost the same in both the techniques.

0795 ANAHOSUR, K.H., and PATIL, S.H. 1983. Assessment of losses in sorghum seed weight due to charcoal rot. Indian Phytopathology 36(1): 85-88. 8 ref.

Losses in weight of sorghum seed due to Macrophomina phaseolina ranged from 15.18-54.59 per cent in different genotypes depending on the per cent lodging levels. Lodging was comparatively less in Kharif as compared to rabi. A direct correlation between per cent lodging and loss in seed weight was observed. Correlation of per cent lodging between hybrids, varieties and parental lines was non-significant indicating that all are uniformly susceptible. Nandyal, a local cultivar was least susceptible and suffered least loss in seed weight whereas CSH-6, CSH-8R, SPV-373 and CSV-7R were highly susceptible there by causing maximum loss.

0796 ANAHOSUR, K.H., and PATIL, S.H. 1983. Evaluation of sorghum genotypes for charcoal rot resistance. Indian Phytopathology 36(2): 407-408. 2 ref.

The genotypes were evaluated at Karnataka, India for Macrophomina phaseolina resistance. Amongst 290 hybrids tested, all were found to be susceptible. Two varieties showed high level of resistance among 490 varieties tested. The progenies, SPV-428, SPV-488 and BRC 5-5-2 also showed high level of resistance with no lodging. Among 14 lines tested all were found to be susceptible with lodging % between 54.6-100. Three local cv. were tolerant with lodging % ranging between 5-12, out of 46 collections tested.

0797 ANAHOSUR, K.H., PATIL, S.H., and HEGDE, R.K. 1983. Evaluation of PCNB against Macrophomina phaseolina (Tassi) Goid causing charcoal rot of sorghum. Pesticides 17(1): 11-12.

Laboratory evaluation of Brassicol revealed that in culture medium (PDA) the growth of the fungus was inhibited upto 86.75% at 5000 ppm. In soil fungus inhibition was non-significant, ranging upto 15.25% at 5000 ppm. Fan-shaped sectors were noticed.

0798 ARIAS, J.A., DUNKLE, L.D., and BRACKER, C.E. 1983. Morphometric analysis of ultrastructural changes induced by Periconia circinata toxin in the outer root cap of sorghum. Canadian Journal of Botany 16(5): 1506-1509. 9 ref. (Summary:Fr).

Outer root cap cells of sorghum seedlings treated with the host-specific toxin produced by Periconia circinata were analyzed morphometrically to detect changes in the quantities of cytomembranes and numbers of organelles and thus extend out observations of qualitative cytological responses to the toxin. In seedlings susceptible to the pathogen, brief treatment with the toxin resulted in a marked and permanent decrease in the amounts of secretory vesicle membrane. By 2 h treatment, only secretory vesicle membrane was decreased, but longer treatments led to an increased amount of endoplasmic reticulum (4 h), which later decreased together with the amount of dictyosome membrane, while the amount of tonoplast increased (8h). In resistant seedlings treated with the toxin, early but transient increases were detected in the quantities of plasma membrane, secretory vesicle membrane, dictyosome membrane, and

endoplasmic reticulum and in the number of dictyosomes. Insensitivity to the toxin may involve the ability of resistant genotypes to recover from the toxic effects.

0799 ARIAS, J.A., DUNKLE, L.D., and BRACKER, C.E. 1983. Ultrastructural and developmental alterations induced by Periconia circinata toxin in the root tip of sorghum. Canadian Journal of Botany 16(5): 1491-1505. 39 ref. (Summary:Fr).

Roots of sorghum seedlings susceptible and resistant to P. circinata were incubated in 500 mg toxin/mL (treated) or water (controls). Root cap cells of resistant seedlings treated with the toxin were cytologically similar to those of controls, although the toxin caused a transient inhibition of mitosis in cells of the primary root tip. In outer root cap cells of susceptible seedlings treated for 0.25 h, hypersecretory activity was lost, secretory vesicles were fewer, and secretory product accumulated between the plasma membrane and cell wall. Also, inner root cap cells showed increased vacuolation. Longer treatments caused increased vacuolation, loss of starch, increased numbers of lipid bodies, pleomorphic amyloplasts, regularly stacked endoplasmic reticulum, apparent changes in the amounts of cytomembranes, dispersion of heterochromatin, and autolysis. Mitochondrial morphology was normal, but lesions in the tonoplast occurred before autolysis. The toxin also inhibited expansion and sloughing off of root cap cells and mitotic activity in the root tip.

0800 INDIRA, S., and RANA, B.S. 1983. Host plant resistance to Macrophomina phaseolina in F1 varietal crosses of sorghum. International Journal of Tropical Plant Diseaes 1(2): 187-192. 6 ref.

Eleven sorghum parents and 55 varietal crosses in a diallel mating system were evaluated for reaction to charcoal rot. The tests were made under receding soil moisture condition during a post-rainy season. The test plants were artificially inoculated by the toothpick method. The F1 hybrids were 16% and 26% less than parental varieties for per cent stalk infection and susceptibility index (SI) respectively. Resistance showed partial dominance for these 2 parameters, but susceptibility was partially dominant for number of nodes cross. RxR hybrids were more resistant than SxR hybrids. The per cent stalk infection, number of nodes crossed and susceptibility index were governed by a high degree of dominance and low heritability. Thus, resistance genes can be gradually accumulated in tropical varieties. SPV-34 and IS 3687 were most effective parents for the transfer of resistance.

0801 INDIRA, S., RANA, B.S., REDDY, B.B., and RAO, N.G.P. 1983. Stability of host plant resistance to sorghum charcoal rot. Indian Phytopathology 36(3): 473-479. 15 ref.

Twentynine entries were evaluated for charcoal rot resistance over 4 environments. There was no host immunity to disease. Inspite of significant genotype x environment interactions, the varietal differences persisted. SPV-34, CSH-9 and 36B among the improved lines developed in AICSIP and 6-39, 8-55 and SC 120-14 among the basic stocks were highly resistant. CSH-9, 36B and 6-39 were average while 8-55 and SC 120-14 were above average in stability of disease resistance. The seasonal change in host plant resistance of some of the varieties was due to their

photoperiodic sensitivity.

0802 INDIRA, S., RANA,B.S., and RAO, N.G.P. 1983. Genetics of host plant resistance to charcoal rot in sorghum. Indian Journal of Genetics and Plant Breeding 43(3): 472-477. 6 ref.

Two sets of F2 and F3 diallel progenies among 7 parents were evaluated for charcoal rot resistance under artificial epiphytotic conditions during post-rainy season without any supplementary irrigation. Progenies in F3 were relatively more susceptible than in F2. Reduction in F3 resistance due to inbreeding was 24%, 64% and 74% respectively for susceptibility index (SI), % infection and number of nodes crossed by charcoal rot. These resistance parameters in F3 were positively and significantly correlated among themselves. General combining ability effects of parents showed significant differences in both generations. 'SPV 34' was most effective parent to transmit resistance in crosses. Resistance is mainly governed by non-additive genetic variance, with high degree of dominance. Heritability varied from 10-28% and was low for different resistant parameters. Though F3 mode pertains to 0-4% class interval of disease infection, the genetic advance is expected to be low.

0803 MOTE, U.M. 1983. Effect of the incidence of charcoal rot on the yield of rabi sorghum. Madras Agricultural Journal 70(11): 753-754. 5 ref.

A field trial was conducted in Maharashtra, India on sorghum cv. CSH-8R and SPV-8R to study the correlation between the charcoal rot and yield. The incidence level, grain and fodder yields were recorded at harvest. Significant negative correlation was obtained between the percentage of affected plants and grain and fodder yields in both the cv. The regression coefficient was negative and statistically significant for yields in 2 cv. The reduction in fodder was more than grain due to the stem hollowness caused by the disease.

0804 MURTY, B.R., TABORDA, F., and REINOSO, A. 1983. Mutation breeding of sorghum for adaptation and disease resistance. Mutation Breeding Newsletter 21: 8.

Seeds of 3 local varieties of Venezuela were treated with gamma irradiation, or sodium azide combined with gamma rays. The 20 selected promising mutants showed 100-125 cm plant height, good head size, resistance to charcoal rot, good grain size, more heads/unit area and yield increases of 40-100% over the parents. Four mutants showed good adaptability in a 3-location trial.

0805 RAO, T.G.N., and BALASUBRAMANIAN, K.A. 1983. Use of rank correlation coefficient in deciding charcoal rot expression parameters in sorghum. Indian Phytopathology 36(2): 363-364. 4 ref.

The study on various infection parameters revealed that a positive relationship existed among the 3 parameters namely the tenacity of the basal stalk, the spread of lesion and the number of internodes invaded by the fungus.

0806 SHINDE, V.K., and VENKATARAO, D.N. 1983. Inheritance of charcoal rot resistance in sorghum. Page 4 In National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Coimbatore, Tamil Nadu, India. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University.

(Abstract).

Resistance to Macrophomina phaseolina was polygenically controlled and additive x dominance and dominance x dominance gene effects played an important role in inheritance.

0807 VENKATRAO, D.N., SHINDE, V.K., and MAYEE, C.D. 1983. Inheritance of charcoal rot and other qualitative characters in sorghum. Journal of Maharashtra Agricultural Universities 8(2): 177-178. 4 ref.

Genetic analysis of qualitative characters of crosses between a resistant variety and a susceptible variety revealed that the resistance to Macrophomina phaseolina was recessive and controlled by 3 complementary genes. The absence of tan pigment in the plant was controlled by a dominant gene. Awnlessness was dominant and governed by 2 inhibitors. The loose panicle was dominant and controlled by one inhibitory and 2 duplicate genes.

0808 WOLPERT, T.J. 1983. An analysis of the mode of action of the host-specific toxins produced by Periconia circinata. Ph.D. thesis, Purdue University, West Lafayette, Indiana, USA. 66 pp.

P. circinata toxin directly or indirectly altered gene expression in susceptible genotypes of sorghum by increasing the rate of transcription of selected RNAs. The data suggests the phytotoxicity results from the increased rate of synthesis of specific proteins.

0809 WOLPERT, T.J., and DUNKLE, L.D. 1983. Alterations in gene expression in sorghum induced by the host-specific toxin from Periconia circinata. Proceedings of the National Academy of Sciences of the United States of America 80(21): 6576-6580. 37 ref.

Pretreatment of seedlings with cycloheximide or cordycepin for 4 hr before treatment with the toxin protected the seedlings against toxin-induced loss of electrolytes and prevented development of disease symptoms. In vivo incorporation of leucine into protein was inhibited 91% and 47% by cycloheximide and cordycepin, respectively, but was not affected by the toxin. Gel electrophoresis and fluorography of in vivo-labeled proteins extracted from non-treated and toxin-treated root tips of near-isogenic susceptible and resistant lines revealed a selective increase in radioactivity of a protein band at Mr 16,000 only in preparations from toxin-treated susceptible root tips. Two-dimensional gel electrophoresis separated the mr 16,000 band into 4 proteins and confirmed the increased rate of synthesis. Products of in vitro translation were substantially enriched with the 4 Mr 16,000 proteins when total RNA from toxin-treated susceptible root tips was used in a cell-free protein-synthesizing system.

Fungi on Grain Seeds (Molds)

0810 ANAHOSUR, K.H. 1983. Assessment of the techniques used in identifying sorghums resistant to grain molds. Sorghum Newsletter 26: 109.

A comparative study was made between 3 techniques to identify sources of resistance. It was found that for obtaining grain mold resistant sorghums, water spray on the panicles after emergence is quite effective for the development of molds.

0811 ANAHOSUR, K.H., and

ADIVER, S.S. 1983. Antagonistic relationship among sorghum grain molds. Sorghum Newsletter 26: 108. 1 ref.

In the process of identifying sorghums resistant to grain molds, the antagonistic relationship of Fusarium moniliforme with Curvularia spp. and Drechslera spp. was assessed by growth on potato dextrose agar (PDA) and by conidial germination in Richards liquid medium. F. moniliforme suppressed the growth of Curvularia and Drechslera. In higher dilutions conidial germination increased due to stimulatory effect of metabolites present in culture filtrates.

0812 D'ERCOLE, N. 1983. Use of Trichoderma in biological control. (It). Informatore Fitopatologico 33(7-8): 37-40.

0813 DESAI, K.B., PATEL, R.H., RAJKULE, P.N., DESAI, D.T., and DESAI, R.T. 1983. Testing of grain mold tolerant progeny for grain yield. Sorghum Newsletter 26: 113.

Results revealed that entry M 90906 gave the highest grain yield followed by M 90362 and both the genotypes were dwarf, early maturing and resistant to grain mold. The entry IS 2328 was highly resistant to grain mold but its low grain yield suggested its possible use in crossing programs only as a source of high resistance to grain mold. Entry GJ 108 was most susceptible to grain mold.

0814 DESAI, K.B., RAJKULE, P.N., PATEL, R.H., and CHAUHAN, G.K. 1983. Artificial method to screen sorghum for resistance to grain mold. Sorghum Newsletter 26: 112-113.

Grain mold rating ranged from 1.2 to 5.0 in the field and from 1.3 to 5.0 in the laboratory. Utilizing both field and laboratory ratings, entries SPV 126, M 90894, E-35-1, SPV 315, SPV 312, SPV 371, and SPV 311 were most resistant to grain mold. Entries SPV 138, SPV 247, CS 3541, CSV 8R and M 90253 were moderately resistant to grain mold.

0815 FAHIM, M.M., ATTIA, M.F., BARAKAT, F.M., and ALY, H.Y. 1983. Aflatoxin production by some Aspergillus flavus isolates from stored sorghum grains. Pages 201-213 In Proceedings of the Fifth Conference on Microbiology, May 1983, Cairo, Egypt. v. 3. Plant pathology. Cairo, Egypt: Egyptian Society of Applied Microbiology. (Summary:Ar).

Ten isolates of Aspergillus flavus obtained from stored sorghum grains were assayed for aflatoxin production. Five toxigenic isolates were able to reduce sorghum grain germination. The treated seeds gave rise to stunted and weak plants. Fayoum "1" isolate caused the highest reduction either in germination or in plant height.

0816 FORBES, G., COLLINS, D., ODVODY, G., and FREDERIKSEN, R.A. 1983. Seedling disease in South Texas during 1983. Sorghum Newsletter 26: 124-125. 2 ref.

Early collections of diseased plants yielded high proportions of Pythium spp., but later collections yielded greater proportions of other fungi including spp. of Fusarium, Trichoderma, Helminthosporium, Curvularia, and Rhizoctonia. The most commonly isolated Pythium spp. had lobulate sporangia and some of these isolates were identified as Pythium arrhenomanes. The lines resistant to the seedling disease were identified when they had stands above 40 with less than 25%

post emergent damping off.

0817 GRANJA, E.M. 1983. Detection and effect of Fusarium moniliforme Sheldon, on the germination of sorghum seeds. (Pt). M.S. thesis, Universidade Federal de Vicosa, Vicosa, MG, Brazil. 44 pp. 46 ref.

0818 KABORE, K.B., and COUTURE, L. 1983. Mycoflora of sorghum seeds grown in Upper Volta. (Fr). Naturaliste Canadien 110(4): 453-457. 13 ref. (Summary:En).

The seed-borne mycoflora of some varieties of sorghum harvested in different regions of Burkina Faso was examined. An internal fungal agent was present in nearly half the seeds of most seed lots assayed. The most common species in all lots was Colletotrichum graminicola. Many Curvularia species were also detected in all parts including the embryo. Cephalosporium acremonium and Ramulispora sorghi were other commonly detected components of the seed mycoflora.

0819 LOUVEL, D. 1983. Grain moulds and sorghum collection. (Fr). Bambey, Senegal: Ministere du Developpement Rural. 27 pp.

0820 N'GAIDE, H., SONG, D.K., KARR, A.L., and WYLLIE, T.D. 1983. Contamination of grain sorghum by Aspergillus flavus and aflatoxin B-1. Transactions of the Missouri Academy of Science 17: 199. (Abstract).

0821 NARAYANA, D., and PRASAD, M.N. 1983. Heterosis and heterobeltiosis for grain yield and resistance to grain moulds in sorghum. Page 4 In National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Coimbatore, Tamil Nadu, India. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

Cross combinations which combine yield heterosis with resistance to Fusarium moniliforme and Curvularia lunata are identified.

0822 NARAYANA, D., and PRASAD, M.N. 1983. Inheritance of resistance to Fusarium grain mould in sorghum. Page 727 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

A diallel set of crosses involving parents, resistant and susceptible to molds were studied for heterosis, combining ability and genetic variation. Additive gene action was found to be predominant in the inheritance of Fusarium molds.

0823 PATEL, R.H., DESAI, K.B., KUKADIA, M.U., and DESAI, M.S. 1983. Inheritance of resistance to grain mold in sorghum. Page 4 In Precongress Scientific Meeting on Genetics and Improvement of Heterotic Systems. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

F1 hybrids and their parents were studied for resistance to molds under normal and late sowing. Nonadditive gene action was observed for resistance. Overdominance and partial dominance were observed in both environments.

0824 PORTA-PUGLIA, A., and CARATELLI, A. 1983. Aspergillus niger, pathogenic on sorghum seed. (It). Annali dell' Istituto Sperimentale per la Patologia Vegetale Roma 8: 59-65. 8 ref. (Summaries:En, Pt).

A seed sample of sorghum from

Brazil was found to be contaminated by A. niger. The infected seeds when sown showed loss of germination and developed leaf and stalk rots. One isolate was found tolerant to benomyl at 100 p.p.m. in potato dextrose agar.

0825 RAJKULE, P.N., DESAI, K.B., DESAI, R.T., and PATEL, R.H. 1983. Field evaluation of sorghum yield trial materials for grain molds. Sorghum Newsletter 26: 115.

It was found that the incidence of grain mold was severe and no entry was free from mold infection when 33 sorghum entries were tested for grain molds at Navsari, Gujarat, India. However, lower incidences were recorded in entries SPV-126, SPV-312, SPV-386, SPV-391, SPH-159, SPH-176, SPH-221 and CSH-9.

0826 RATHORE, B.S., MATHUR, K., and NAIK, S.M.P. 1983. Occurrence and development of black dots on sorghum grains in Rajasthan. Sorghum Newsletter 26: 116.

The disease manifested in the form of small, pinhead dark eruptions on mature grains and glumes without any pattern. In most of the cases the side of the ear head facing the sunlight had black dots on grain. The causal organism was identified as Phoma sorghina. Maximum disease intensity and per cent infected threshed grain were observed when ear heads were inoculated at the milk stage. Light and humidity were found to be important in disease development.

0827 SARWAR, A.H. 1983. Breeding for disease resistance to sorghum grain mold and germination percentage performance responses. Sorghum Newsletter 26: 110.

Out of the 26 entries treated with fungal suspension inoculation IS-14332, Sel-4, Sel-10, IL-8, IL-13, and IL-19 showed least grain mold infection and greatest germination percentage.

0828 SEITZ, L.M., MOHR, H.E., BURROUGHS, R., and GLUECK, J.A. 1983. Preharvest fungal invasion of sorghum grain. Cereal Chemistry 60(2): 127-130. 8 ref.

Sorghum grain from Kansas and Texas, USA was analyzed for fungal invasion by ergosterol and whole seed plating assays. Five sorghum hybrids grown in 1977 were harvested at 12 weekly intervals. Ergosterol content increased rapidly 2-3 weeks after physiological maturity and then relatively slowly the next 7 to 8 weeks as the grain weathered and discoloured. The 5 hybrids differed little in susceptibility to fungal invasion. Species of Alternaria and Fusarium were found in all of the hybrids, with the former predominant. When Alternaria spp. began invading the grain, ergosterol contents began to increase. Sorghum lines from Texas College Station, TX, were harvested on two dates 29 days apart. Due to wet weather, fungal invasion was extensive at the first harvest and was greater in all lines, at the second harvest. Although visual ratings of weathering and discolouration in the field correlated positively with ergosterol contents, the ratings did not adequately indicate extent of fungal invasion. Concentrations of ergosterol and another fungal metabolite correlated.

0829 SINCLAIR, J.B. 1983. Fungicide sprays for control of internally seed-borne fungi. Seed Science and Technology 11(3): 959-968. 28 ref. (Summaries:De, Fr).

The use of pre-harvest fungicide sprays on sorghum and other crops was found promising in tropics,

subtropics and temperate regions. The control of Cercospora, Cladosporium, Colletotrichum, Fusarium, Lasiodiplodia, Phomopsis, Rhizoctonia, and Septoria by these sprays is reviewed. The association of Alternaria spp. with seeds of plants sprayed with preharvest fungicides is discussed.

0830 TRIMBOLI, D.S., and BURGESS, L.W. 1983. Reproduction of Fusarium moniliforme basal stalk rot and root rot of grain sorghum in the greenhouse. Plant Disease 67(8): 891-894. 18 ref.

Basal stalk rot and root rot of grain sorghum were reproduced in plants grown in the greenhouse in Fusarium moniliforme-infested soil at optimal soil moisture until flowering then subjected to a gradual development of severe moisture stress between flowering and the middough stage, followed by rewetting. Stalk rot did not develop and root rot was not severe in plants grown to maturity at optimal soil moisture although many of these plants were infected by F. moniliforme. Stalk and root rot developed in the majority of stressed plants grown in soil initially uninfested but contaminated by F. moniliforme after planting.

0831 VIDHYASEKARAN, P. 1983. Control of Fusarium moniliforme infection in sorghum seed. Seed Science and Technology 11(2): 435-439. 6 ref. (Summaries:De, Fr).

Fusarium moniliforme infection in sorghum resulted in inhibition of seed germination. The plants from infected seed were dwarf and the straw and grain yield were very much affected. Carbendazim seed treatment eradicated F. moniliforme from seed and increased both the height of the plants and the straw and grain yield.

0832 WU, W. 1983. Sorghum diseases in Taiwan and characterization and control of its seed-borne pathogens. Plant Protection Bulletin (Taiwan) 25(1): 1-13. 26 ref. (Summary:Ch).

Colletotrichum graminicola, Curvularia geniculata, C. lunata, Drechslera longirostrata, D. maydis, D. rostrata, D. sativum, D. sorghicola, Fusarium moniliforme, Gloeocercospora sorghi, Phoma sorghina, Puccinia sorghi and Rhizoctonia solani were proved to be pathogenic among the 15 genera of fungi found on diseased parts of sorghum plants. G. sorghi and P. sorghina are new records in Taiwan. F. moniliforme was the most prevalent seed-borne pathogen and mostly located on the surface or outerlayer of seed. Drechslera bicolor and D. turcica were detected from seed and proved to be pathogenic when inoculated on leaves. Curvularia lunata was the most commonly isolated from seeds. C. lunata, F. moniliforme, and P. sorghina were frequently transmitted through the seeds to seedlings. C. lunata and F. moniliforme appeared to be embryo-borne in the seed. Treating seed with 1% NaOCl improved emergence and decreased the severity of disease on seedlings.

Bacterial Diseases

0833 FORBES, G., and CRESPO, L.B. 1983. Screening for resistance to bacterial stripe on sorghum with dried infested leaf material. Sorghum Newsletter 26: 106-107. 1 ref.

The inoculation technique was an effective means of identifying sorghum genotypes with high levels of resistance to Pseudomonas

andropogonis.

0834 GITAITIS, R.D., MILLER, J., and WELLS, H.D. 1983. Bacterial leaf spot of white clover in Georgia. Plant Disease 67(8): 913-914. 5 ref.

In greenhouse tests, the bacterium Pseudomonas andropogonis caused stripes on leaves of sweet corn and sorghum and leaf spots on velvet bean as well as four other species of clover.

0835 GRANADA, G.A., and SEQUEIRA, L. 1983. Survival of Pseudomonas solanacearum in soil, rhizosphere, and plant roots. Canadian Journal of Microbiology 29(4): 433-440. 25 ref. (Summary:Fr).

A new, selective medium was used to determine the ability of different strains of Pseudomonas solanacearum to survive in the soil or in association with plant roots in the greenhouse. Nonhost plants, such as bean, peas, soybean, corn, sorghum, and rice, were grown from seed planted in soil infected with strains of race 1. High populations of the bacterium were recovered from surface-sterilized roots throughout the growth cycle of these plants. Thus, long-term survival of P. solanacearum appeared to be correlated with its ability to infect plant roots.

0836 HOWELL, M.L., and FREDERIKSEN, R.A. 1983. Screening sorghum for resistance to bacterial stripe and streak. Phytopathology 73(3): 502. (Abstract).

The methods for inoculation of sorghum with Pseudomonas andropogonis (PA) and Xanthomonas campestris (XH) for field and greenhouse experiments are outlined. Lines BTx3197 and QL3 (India) were found resistant to PA and CS 3541 and Tx 378 to XH.

Virus Diseases

0837 ALEXANDER, J.D., and TOLER, R.W. 1983. Infection of grain sorghum by maize dwarf mosaic virus strain B. Phytopathology 73(3): 498. (Abstract).

Eleven varieties were found to be susceptible to the virus out of 27 varieties tested in the field and greenhouse.

0838 DAMSTEEGT, V.D. 1983. Maize streak virus. 1. Host range and vulnerability of maize germplasm. Plant Disease 67(7): 734-737. 17 ref.

Several maize hybrids, sorghum species, and major cereal crop cultivars were tested for susceptibility to mosaic streak virus (MSV) in both seedling and 6-8 leaf stages. Out of 34 sorghum accessions tested, 6 developed symptoms of MSV. Grain sorghum Tx 412 was susceptible and sweet sorghum cultivar Rio was immune. Sorghum halepense was immune to MSV and served as an excellent host to the vector Cicadulina mbila.

0839 DOCAMPO, D.M., LAGUNA, I.G., GIORDA, L.M., and TEXSSANDIER, E. 1983. The presence of maize dwarf mosaic virus (strains A and B) in Sorghum bicolor (L.) Moench in Argentina. Sorghum Newsletter 26: 105-106. 1 ref.

In different genotypes and varieties of sorghum in Argentina some previously unknown foliar and general symptoms were observed and their etiological causes were detected. It was found that each of the symptoms is produced by the strains A and B of maize dwarf mosaic virus. The presence of

other strains of MDMV, sugar cane mosaic virus, and other viruses was still a possibility.

0840 GARUD, T.B., and MALI, V.R. 1983. Reactions to sorghum red stripe virus of sorghum genotypes having resistance to other pathogens. Page 26 In National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Coimbatore, Tamil Nadu, India. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

Thirty-five genotypes resistant to fungi were screened for resistance to red stripe virus in a greenhouse. Most of the genotypes were found susceptible to the virus.

0841 GARUD, T.B., and MALI, V.R. 1983. Red stripe virus disease of sorghum in India. Indian Phytopathology 36(3): 545-546. 12 ref.

Based on transmission, physical properties, host range and serological tests, the virus involved in sorghum red stripe in India is identified as a sugarcane mosaic virus.

0842 GIORDA, L., TOLER, R.W., and MILLER, R. 1983. Identification of sugarcane mosaic virus strain H occurring in commercial grain sorghum in Texas. Phytopathology 73(3): 501. (Abstract).

Identification of this isolate was based on host range including johnsongrass, symptomology on 26 sorghum accessions, morphology, serology and immunoelectron microscopy. The SCMV isolate found naturally infecting sorghum in Texas was strain H (SCMV-H). PAG 3387 was found to be a differential host for MDMV-A and SCMV-H.

0843 GIORDA, L.M., LAGUNA, I.G., and DUCASE, D. 1983. Effect of maize and sorghum dwarf mosaic virus (MDMV) on Sorghum bicolor (L.) Moench. (Es). Page 10 In Resumenes, 5. Jornadas Fitosanitarias Argentinas, 7-9 September 1983, Rosario, Santa Fe, Argentina. Rosario, Santa Fe, Argentina: Universidad Nacional de Rosario.

0844 IZADPANAH, K., AHMADI, A.A., PARVIN, S., and JAFARI, S.A. 1983. Transmission, particle size and additional hosts of the rhabdovirus causing maize mosaic in Shiraz, Iran. Phytopathologische Zeitschrift 107(3): 283-288. 12 ref. (Summary:De).

The rhabdovirus causing maize mosaic in Shiraz, Iran, is transmitted by Ribautodelphax notabilis Logvinenko (Homoptera, Delphacidae). Average size of bullet-shaped virus particles in negatively stained leaf-dip preparations of naturally or experimentally infected plants was 81 x 179 nm. The virus is transmitted to wheat and barley causing mosaic and severe stunting. Similar virus particles have been observed in leaf-dip preparations of naturally infected wheat, barley and sudangrass. This is believed to be the first record of the involvement of R. notabilis in virus transmission. The relationship of the described isolate with similar viruses infecting gramineous plants is discussed.

0845 JARJEES, M.M., and UYEMOTO, J.K. 1983. Maize dwarf virus: effect of time of inoculation and symptomatology on performance of sorghum (Sorghum bicolor). Plant Disease 67(5): 488-489. 17 ref.

Two near-isogenic sorghum inbreds CK60 and KS56, were inoculated with

maize dwarf mosaic virus strain A at three plant-growth stages. These inbreds differed in their responses to viral infections; under cool temperatures, CK60 developed tissue necrosis (red leaf disease) and KS56 a mosaic symptom. Results showed statistically significant yield losses with all virus treatments compared with their respective controls. At the earliest growth stage, yields of inoculated CK60 and KS56 were reduced 61 and 26%, respectively.

0846 JENSEN, S.G., and DAVIDSON, B.L. 1983. Proteins in MDMV infected sorghum. Phytopathology 73(5): 791. (Abstract).

Coat proteins of different strains of MDMV did not differ in migration but the 60Kd protein of different strains did vary.

0847 NARROS, J., BERGER, P.H., and TOLER, R.W. 1983. Sorghum viruses in Mexico. Phytopathology 73(3): 504. (Abstract).

In the International Sorghum Virus Nursery grown in Mexico MDMV was the most prevalent virus but sugarcane mosaic virus (SCMV) was found in some complex infections with MDMV.

0848 TOLER, R.W., and BERGER, P.H. 1983. Reaction of grain sorghum accessions to brome mosaic virus. Sorghum Newsletter 26: 122-123. 6 ref.

There were consistent differences in the reaction of the sorghums to BMV indicating resistance in sorghum to this virus. The 4 most resistant accessions were SA 394, Tx 3197, OKY 8, and PI 35038; the 4 most susceptible were QL 3, New Mexico 31, BTx 398 and SCO 175-14E.

0849 TOLER, R.W., and MILLER, F.R. 1983. Effect of various combinations of inoculation pressure and concentration on varietal disease response of sorghum following spray gun inoculation with maize dwarf mosaic virus. Crop Science 23(1): 83-85. 6 ref.

Ten inbred line sorghum genotypes of known MDMV reaction were artificially inoculated at 1:10 and 1:100 (w/v), tissue to buffer concentration at 0, 1.4, 4.2 and 7.3 kg/cm2 pressure and rated on an individual plant basis 21 days after inoculation. Pressure, concentration, and genotype Disease Severity Index (DSI) were varied. Significant interactions were detected between pressure and concentration of inoculum. High pressures increased genotypic susceptibility as did greater virus concentration. Even though DSI varied under different pressure and concentration combinations, genotypes responded uniformly and rankings remained unchanged.

Nematode Diseases

0850 ACHARYA, A., and DAS, S.N. 1983. Host range and pathogenicity of Macroposthonia ornata on ragi (Eleusine coracana). Indian Journal of Nematology 13(1): 9-15.

0851 BIRCHFIELD, W. 1983. Wheat and grain sorghum varietal reaction to Meloidogyne incognita and Rotylenchulus reniformis. Plant Disease 67(1): 41-42. 5 ref.

Sorghum varieties Funk G 421, Funk G 499 BR, Funk G 516 BR, Funk G 522 A, Funk G 522 BR, Funk G 550, Funk G 611, Funk G 623, and DeKalb D 55 were susceptible to M. incognita. All wheat and sorghum varieties tested were nonhosts of

the reniform nematode, Rotylenchulus reniformis.

0852 MCSORLEY, R., and PARRADO, J.L. 1983. Influence of summer management strategies on nematode populations in a subtropical agroecosystem. Nematropica 13(1): 1-8. 10 ref. (Summary:Es).

During 1980 and 1981 nematode populations were compared before and after eight different summer management strategies on land used for autumn and winter vegetable production in South Florida. The various strategies assessed included summer fallow; cover cropping with maize or sorghum; maintenance of uniform weed covers. Populations were maintained on summer cover crops of maize or sorghum but declined under summer fallow. Populations of Quinisulcius acutus (Allen) Siddiqi and Helicotylenchus dihystera Sher increased under all strategies except fallow. Populations of Q. acutus following sorghum were significantly greater than those achieved following most other management strategies.

0853 PATHAK, A.K., and YADAV, B.S. 1983. Host range of root-knot nematode, Meloidogyne incognita on selected graminaceous field crops. Indian Journal of Mycology and Plant Pathology 13(1): 92-93. 8 ref.

Sorghum was one of the 7 hosts selected for the study. The observations on galls/plant, no. of egg masses/plant, no. of eggs/egg mass and total eggs and larvae/plant showed that the maize was infected to the greatest extent followed by barley, wheat, oat, sorghum, pearl millet and rice.

0854 RHOADES, H.L. 1983. Effects of cover crops and fallowing on populations of Belonolaimus longicaudatus and Meloidogyne incognita and subsequent crop yields. Nematropica 13(1): 9-16. 7 ref. (Summary:Es).

High populations of the sting nematode, Belonolaimus longicaudatus, developed on summer cover crops of a sorghum-sudangrass hybrid, sesbania and weeds. Meloidogyne incognita did not develop to high populations on any of the crops but was more numerous on vegetable crops following sesbania and cowpea. Yields of the first crops following the cover crops that had built up populations of B. longicaudatus were greatly increased following in-row applications of 2.24 kg/ha of fenamiphos. Only moderate increases in yield occurred for treatment with fenamiphos following soil fallow and cover crops that did not build up this nematode. Yields of the second crop of vegetables following the summer cover crops and fallowing were improved and populations of both nematode species reduced by fenamiphos in all instances.

0855 SHARMA, R.D., and MEDEIROS, A.C.D. 1983. Nematodes associated with grain sorghum in the Federal District, Brazil. (Pt). Pesquisa Agropecuaria Brasileira 18(1): 49-53.

0856 THOMAS, S.H. 1983. Effect of nematicides on sorghum yield and lesion nematode [Pratylenchus spp.] control in eastern New Mexico, 1981. Fungicide and Nematicide Tests Results 38: 5-6.

Parasitic Plants - Striga

0857 BA, A.T. 1983. Striga resistance screening of some

cultivars of pearl millet, sorghum, maize, and cowpea. Pages 47-49 In Proceedings of the Second International Workshop on Striga, 5-8 October 1981, Patancheru, Andhra Pradesh, India. Patancheru, Andhra Pradesh, India: ICRISAT. 1 ref. (Summary:Fr).

Out of the 13 cv. screened for Striga hermonthica resistance at Dakar, Senegal, 5 from Senegal and one from Burkina Faso were tolerant. Remaining 4 cv. from Burkina Faso were resistant.

0858 BABIKER, A.G.T., and HAMDOUN, A.M. 1983. Factors affecting the activity of ethephon in stimulating seed germination of Striga hermonthica (Del.)Benth. Weed Research 23(3): 125-131. 16 ref. (Summaries:De, Fr).

Ethephon stimulated the germination of pre-conditioned seeds of Striga hermonthica when it was added to the alkaline Gezira clay soil at concentrations of 2.5 to 30 mg/kg to stimulate germination. Ethephon in soil did not cause germination of unconditioned seeds for periods of up to 12 days and also had an adverse effect on seed germination when such seeds were given a second ethephon exposure after a storage period which was adequate, in untreated soil. Ethephon activity persisted in air-dry soil but declined over a 14 day period in moist soil. In the field ethephon at 0.6 to 4.8 kg/ha decreased the number of Striga shoots and increased sorghum height and flowering.

0859 BARCHE, N.B., and DABHOLKAR, A.R. 1983. Screening for Striga resistance. Sorghum Newsletter 26: 112.

Twenty cv. of sorghum were evaluated at Madhya Pradesh, India for resistance to Striga asiatica. Results revealed that SAR 9 had the lowest infection by Striga and the highest yield.

0860 BORIKAR, S.T., SINGH, A.R., KATKADE, J.L., and PAWAR, K.R. 1983. Effect of Striga infestation on seed quality and vigor in sorghum. Sorghum Newsletter 26: 55-56.

Results indicated that both seed germination and vigor are reduced by Striga infestation.

0861 DESAI, M.S., DESAI, K.B., and KUKADIA, M.U. 1983. Stability of striga-resistant varieties of sorghum. Indian Journal of Genetics and Plant Breeding 43(2): 212-214. 10 ref.

Eight striga-resistant sorghum varieties were tested over eight environments and stability assessed. The variety x environment interaction was highly significant. Mean performance was significantly correlated with the stability parameters which also showed inter se correlation.

0862 KULKARNI, N., and SHINDE, V.K. 1983. Important parameters of Striga resistance. Sorghum Newsletter 26: 25.

Suggests that it is important to consider Striga dry weight and Striga height index while grading genotypes for Striga resistance.

0863 MUSSELMAN, L.J., and SAND, P.F. 1983. Giant witchweed, Striga hermonthica (Del.) Benth. Weeds Today 14(4): 7.

The emergence, and importance of Striga as a parasite of sorghum and millet in West Africa is discussed.

0864 MUSSELMAN, L.J., MATTESON, P.C., and FORTUNE, S. 1983. Potential pollen vectors of Striga hermonthica

(Scrophulariaceae) in West Africa. Annals of Botany 51(6): 859-862.

0865 NEKOUAM, N. 1983. Evaluation of some varieties of sorghum for resistance to Striga hermonthica (Del.) Benth. (Fr). Thesis, Universite de Ouagadougou, Ouagadougou, Burkina Faso. 86 pp. 18 ref.

0866 OBILANA, A.T. 1983. Striga studies and control in Nigeria. Pages 87-98 In Proceedings of the Second International Workshop on Striga, 5-8 October 1981, Ouagadougou, Upper Volta. Patancheru, Andhra Pradesh, India: ICRISAT. 11 ref. (Summary:Fr).

Sorghum, pearl millet, maize, and cowpeas are confirmed hosts of Striga in the Nigerian savannas. The distribution and host range of the species, particularly S. hermonthica and S. gesnerioides, in the four different savanna zones are indicated. Research methodology and evaluation methods for Striga studies related to host resistance and integrated control measures are discussed. The breeding procedures used in developing resistant cultivars and the genetic studies of sorghum are described.

0867 OGUNLELA, V.B. 1983. Striga, fertilizer application and hybrid sorghum performance in the Nigerian savanna. Zeitschrift fuer Acker-und Pflanzenbau 152(3): 208-218. 20 ref. (Summary:De).

Response to NP fertilization by sorghum cv. was up to 66 kg N + 20 kg P/ha. Sorghum cv. differed significantly in grain yield, Striga infestation and Striga dry weight. Rate of fertilization influenced Striga infestation and growth. Levels of Striga infestation and host cv. tolerance strongly determined the relative performance of the different cv. The high susceptibility of SSH4 to Striga was contributed to its poor yield performance in the Nigerian savanna. Both sorghum grain yield and stover yield were significantly negatively correlated with Striga infestation.

0868 PARKER, C., and DIXON, N. 1983. The use of polyethylene bags in the culture and study of Striga spp. and other organisms on crop roots. Annals of Applied Biology 103: 485-488. 9 ref.

A technique is described by which root parasites such as Striga and Orobanche species may be grown on the roots of host plants including sorghum growing on a layer of glass-fibre filter paper in a flattened, standard polyethylene bag. The single-bag units are compact, inexpensive, simple to set up and allow repeated observation without damage. Some other potential uses of the technique are described.

0869 PARKER, C., and WILSON, A.K. 1983. Striga-resistance (Striga hermonthica) identified in semi-wild 'Shibra millet' (Pennisetum sp.) parasitic weed: resistance transfer trials; Sorghum bicolor in West Africa. International Symposium over Fytofarmacie en Fytiatrie 35(3): 1111-1117. 9 ref.

0870 RAMAIAH, K.V. 1983. Striga research at ICRISAT Upper Volta Center. Pages 53-60 In Proceedings of the Second International Workshop on Striga, 5-8 October 1981, Ouagadougou, Upper Volta. Patancheru, Andhra Pradesh, India: ICRISAT. 13 ref. (Summary:Fr).

The ICRISAT/Upper Volta Striga program started in the 1979 crop season with the objective of developing cv. of sorghum and pearl millet resistant to Striga

hermonthica and assessing the importance of physiological strains in breeding cv. with broad-spectrum, stable resistance. During 1979 and 1980 considerable progress was made in confirming the resistance of cv. identified earlier at ICRISAT Center in Patancheru, India. The two most stable resistant cultivars identified were N-13 (from India) and SRN-4841, a brown sorghum of Nigerian origin. Both also possess excellent drought resistance in addition to Striga resistance. SRN-4841, showed promise as it had good seedling establishment and vigor and better yield potential than the local varieties. The existence of crop-specific strains of Striga hermonthica and their importance in a breeding program is discussed.

0871 RAMAIAH, K.V., PARKER, C., RAO, M.J.V., and MUSSELMAN, L.J. 1983. Striga identification and control handbook. (Fr). Patancheru, Andhra Pradesh, India: ICRISAT. 52 pp. (Summary:En). Bulletin d'Information no. 15).

It describes the most important of the 25 species of Striga occurring on sorghum and other crops, their biology, and symptoms of attack. It also provides brief information about the options for controlling the parasite. A key is presented to assist in the identification of the seven most damaging species of Striga, and the text is supported by 34 illustrations in colour.

0872 RAMAIAH, K.V., PARKER, C., RAO, M.J.V., and MUSSELMAN, L.J. 1983. Striga identification and control handbook. Patancheru, Andhra Pradesh, India: ICRISAT. 52 pp. (Summary:Fr). (Information Bulletin no. 15).

It describes the most important of the 25 species of Striga occuring on sorghum and other crops, their biology, and symptoms of attack. It also provides brief information about the options for controlling the parasite. A key is presented to assist in the identification of the seven most damaging species of Striga, and the text is supported by 34 illustrations in colour.

0873 RAO, M.J.V., CHIDLEY, V.L., and HOUSE, L.R. 1983. Genetics of field resistance to Striga asiatica (L.) Kuntze in sorghum. Sorghum Newsletter 26: 111-112. 1 ref.

Striga reactions of the hybrids indicated that all the 15 hybrids tested were susceptible. It is found to be important to get Striga resistant-A lines if Striga resistant hybrids are to be produced since the Striga resistance of the male parents is being suppressed in the hybrids. General combining ability (CGA) effects of the 8 parents tested indicated that S-999 and CS-3541 among males and 2219A among females had negative CGA effects. However, mean Striga reactions were high.

0874 RAO, M.J.V., CHIDLEY, V.L., GILLIVER, B., and HOUSE, L.R. 1983. A new screening methodology for Striga resistance breeding. Page 731 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

A new 'three-stage' screening methodology was developed at ICRISAT Center, India to screen breeding lines for resistance to Striga asiatica. The three stages are observation nursery, preliminary screening and advanced screening. A set of field layouts and statistical analytical procedures were developed to

specifically measure and account the soil heterogeneity-linked Striga infestation variability. The 'checkerboard' layout was deployed at the advanced screening stage which provides a unique layout where the test entry yields could be assessed in the presence of Striga, at the same time measuring the yield loss occurring in the susceptible control.

0875 RAO, M.J.V., CHIDLEY, V.L., MUKURU, S.Z., and HOUSE, L.R. 1983. Screening methodology and breeding sorghum for resistance to Striga asiatica (L.) Kuntze at ICRISAT Center. Page 53 In National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Coimbatore, Tamil Nadu, India. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

N13 was the most stable resistant line among the 640 lines tested. The crosses of derivatives of resistant x adapted lines produced a series of resistant lines with improved yield and grain quality traits.

0876 SHERIF, A.M. 1983. Effect of nitrogen and organic matter on Sorghum bicolor (Moench) and Striga hermonthica (Benth). M.Sc. thesis, University of Reading, Reading, UK. 35 pp. 23 ref.

Nitroform and (NH4)2 SO4 were compared with organic manures to determine the effect of N on sorghum, Striga and on the production of Striga germination stimulant. High level of N had effect on the growth of sorghum and increased its resistance to Striga. It delayed germination and emergence and did not influence the Striga germination stimulant or the formation of haustoria. Organic manures did not affect Striga germination and its establishment on sorghum. Soil type did not influence stimulant exudation in a susceptible variety.

0877 SHINDE, V.K., and KULKARNI, N. 1983. Effect of fertility levels of Striga incidence. Sorghum Newsletter 26: 24.

Results indicated that replication effects were significant under low fertility but not under normal fertility level. The parental component was highly significant under both fertility levels, partitioning of parents between resistant and susceptible gave differences under low fertility but not under normal fertility.

0878 SHINDE, V.K., and KULKARNI, N. 1983. Genetic analysis of Striga resistance in sorghum. Page 734 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Resistance to Striga was measured in terms of per cent Striga incidence, Striga dry weight and Striga height index. Both additive and non-additive nature of gene action were found important in the inheritance of resistance parameters with predominance of additive gene action. The reciprocal differences were considered important in the inheritance of Striga dry weight.

0879 SHINDE, V.K., AMBEKAR, S.S., and NANDANWANKAR, K.G. 1983. Evaluation of F2 diallel for Striga resistance in sorghum. Sorghum Newsletter 26: 24.

It was observed that the range of Striga infestation in resistant parents was between 8 to 35% while

in susceptible parents it was 42 to 100%. F2 generation of R x R crosses had 37% Striga infestation, R x S and S x R crosses had 50 to 60% infestation, and S x S crosses were as good as susceptible parents. It was suggested to select crosses between resistant parents for development of resistant varieties.

0880 SHINDE, V.K., NANDANWANKAR, K.G., AMBEKAR, S.S., and PIMPRIKAR, Y.K. 1983. Evaluation of F3 progenies for Striga resistance. Sorghum Newsletter 26: 25.

Concludes that the genes responsible for Striga resistance in the original parents, S-1841, SPV-86, N-13, or CSV-5 might be in a heterozygous condition.

0881 STEWART, D.M., and HARRIS, C.E. 1983. Witchweed resistance in sorghum and millet in the Yemen Arab Republic. Plant Disease 67(6): 614-615. 4 ref.

Three cv. of sorghum (Bahry, Harity and Sahul) and one pearl millet were tested for resistance to Striga. Barley was resistant to S. asiatica and S. hermonthica. The other cv. of sorghum were highly susceptible. The significance of these sources of resistance to Striga spp. are discussed.

0882 SUBBARAYUDU, V.C., REDDY, B.M.M., and JAGDISH, C.A. 1983. Note on a successful method of Striga infection in sorghum crosses involving resistant/tolerant and susceptible parents. Sorghum Newsletter 26: 110-111.

Results indicate that the nature of resistance/tolerance and susceptibility can best be studied through using a ratooned crop instead of a seed crop. Compared to a seed crop the ratoon crop has a better developed root system with closer proximity to the Striga seeds ensuring more successful infections and minimizing the probability of escapes.

Entomology

0883 ABASA, R.O. 1983. Current and future pest management strategies in polycultural systems in East Africa. Insect Science and its Application 4(1-2): 167-171. 35 ref.

Polycultural farming is widely practised in East Africa and has the advantage of ensuring a steady supply of food for the family throughout seasons of adequate rainfall. The food crops interplanted include sorghum-maize-beans, and maize-sorghum-groundnuts. There is a large pest complex associated with the system, but the severity of attack has only been quantified for a few. Pest management is largely indirect relying on natural enemies, weather conditions and removal and destruction of damaged plants. Wood ash is probably the only direct control applied. Crop yield losses are on the average minimal. Among pest management strategies proposed for the future are introduction and propagation of pest resistant high-yield crop varieties, compatibility between food crops interplanted, suitability of soil types for a given combination, augmentation of beneficial insects and the use of nematode-suppressor plants either as interplants or during crop rotation and fallowing.

0884 AGARWAL, B.L., ABRAHAM, C.V., MUKURU, S.Z., and HOUSE, L.R. 1983. Sorghum improvemet for pest resistance at ICRISAT. II.

Breeding for resistance. Presented at the All India Coordinated Sorghum Improvement Project Workshop, 18-22 April 1983, Hisar, India. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0885 AGARWAL, B.L., TANEJA, S.L., SHARMA, H.C., MAITI, R.K., LEUSCHNER, K., MUKURU, S.Z., and HOUSE, L.R. 1983. Sorghum improvement for pest resistance at ICRISAT. Presented at the National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Tamil Nadu Agricultural University, Coimbatore, India. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0886 BA-ANGOOD, S.A., and HUBAISHAN, M.A. 1983. Effect of sowing date and sorghum cultivars on shootfly and stem borers. Page 100 In Proceedings of the Tenth International Congress of Plant Protection, 20-25 November 1983, Brighton, UK. v.1. Croydon, UK: British Crop Protection Council. 1 ref.

Several high-yielding varieties of sorghum were tested in Yemen Democratic Republic in 1980-82 for infestation by Atherigona yorki, Chilo partellus and Sesamia cretica on different sowing dates to study their effect on yields. Sowing Dwarf White Milo (DWM) in March, August and September gave higher yields. 26 August and 16 September were the best sowing dates. DWM was more prone to infestation than the local variety. B815, W823, and 8454 gave higher yields than the DWM.

0887 BLUMBERG, A.Y., and CROSSLEY, D.A., JR. 1983. Comparison of soil surface arthropod populations in conventional tillage, no-tillage and old field systems. Agro-Ecosystems 8(3-4): 247-253. 17 ref.

Soil surface arthropod populations in conventional tillage (CT), and no-tillage (NT) sorghum and adjacent old field (OF) were compared using pitfall trap captures. Overall diversity (H) and similarity quotients (QS) between systems were calculated for each of seven 24-h sampling periods throughout the season. Diversity of the soil surface arthropods was greater in NT than either CT or OF. Although each system was distinct (any two of the systems had less than 30% of their species in common), NT was most similar to OF and least similar to CT during a period of drought and after heading of the sorghum. Percentages of individuals and species represented by spiders were similar in NT (30 and 15%) and OF (22 and 17%); percentages were substantially less in CT (11 and 8%). Yields (biomass of sorghum) in CT and NT were not significantly different despite the generally predicted higher pest populations in NT in the absence of insecticides. Leaf area grazed by insects was greater in CT (28%) than in NT (12%).

0888 BOOZAYA-ANGOON, D. 1983. Sorghum resistance to insect pests. Ph.D. thesis, Oklahoma State University, Stillwater, Oklahoma, USA. 113 pp.

Varietal resistance, inheritance of resistance and mechanism of resistance in sorghum to Contarinia sorghicola, Schizaphis graminum and Blissus leucopterus was studied and the feasibility of transferring resistance to these insect pests to high yielding varieties was determined.

0889 COPPOCK, S., and MASSEY, B. 1983. Control of sorghum insects. OSU Extension Facts, Oklahoma State University,

Cooperative Extension Service no. 7170. 4 pp.

Suggestions for the control of sorghum insects by insecticides are given for the use of sorghum growers at Oklahoma, USA.

0890 DANIELS, N.E. 1983. Insect and mite (Arthropod) pests of major crops. Pages 489-524 In Dryland agriculture (Dregne, H.E., and Willis, W.O., eds.). Madison, Wisconsin, USA: American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America. 125 ref.

Pests attacking sorghum, wheat, corn, alfalfa and cotton in Texas, USA, and their control measures are described.

0891 DHALIWAL, G.S. 1983. Allelochemics and insect resistance in crop plants. Pesticides 17(6): 3-8. 68 ref.

A number o_ allelochemics responsible for imparting resistance to insect pests in crop plants including sorghum have been identified. These chemicals vary from complex molecules such as DIMBOA in maize and gossypol in cotton to simple compounds such as hydrogen cyanide and phenolic acids in sorghum and benzyl alcohol in barley. These allelochemics possess remarkable biological activity against a variety of insect pests. The current status of research on allelochemics, their role in developing insect resistant crop varieties and integrated pest management programmes along with future implications are discussed.

0892 DOUMBIA, Y.O. 1983. Host plants of the Cecidomydae of sorghums and millets at the agronomic research station of Sotuba (Mali). (Fr). Bamako, Mali: Institut d'Economie Rurale. 7 pp.

0893 DOUMBIA, Y.O., and TOURE, K. 1983. Study of sorghum head pests. (Fr). Pages 14-22 In Commission Technique des Productions Vivrieres et Oleagineuses. Cellule Defense des Cultures Projet lutte integree Mali. Resultats campagnes 1982-1983, Entomologie (Doumbia, Y.O., Sidibe, B., Toure, K., and Bonzi, M.S.). Bamako, Mali:Institut d'Economie Rurale. (Document no. 6).

0894 EL-BASHIR, E.S. 1983. Research and other activities in the field of entomology [pest control, sorghum, Yemen Arab Republic]. Taiz, Yemen Arab Republic: Ministry of Agriculture and Fisheries, Agricultural Research Service. 96 pp. 13 ref.

0895 GARDNER, W.A., and DUNCAN, R.R. 1983. Effects of planting date and ratoon cropping on the natural incidence of selected insect pests of grain sorghum in Central Georgia. Journal of the Georgia Entomological Society 18(3): 327-335. 20 ref.

Response of pest infestations in sorghum ratooned for grain were generally the same as the observed responses of the pests of later planting dates with the exception of the lesser cornstalk borer. Larvae of this pest did not damage the ratoon (second) crop because plant regrowth originates from a well-established root system which is not affected by lesser cornstalk borer feeding. Other pests including corn earworm, fall armyworm, sorghum webworm, and sorghum midge posed a greater potential threat to the ratoon rather than the first crop. Stages of the crop which are susceptible to pest damage occur during high seasonal densities of these pests. Grower awareness of these potential threats to late plantings or ratooned sorghum is essential in

preparing management strategies to combat such problems in grain sorghum production.

0896 KISHORE, P. 1983. Breeding for multiple resistance in sorghum. Page 6 In National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Coimbatore, Tamil Nadu, India. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

About 12,000 lines from a world germplasm collection were screened for resistance to Atherigona soccata and Chilo partellus at AICSIP, India.

0897 LEUSCHNER, K., and SHARMA, H.C. 1983. Estimation of losses caused by sorghum panicle pests. Presented at the All India Workshop on Crop Losses due to Insect Pests, 7-9 January 1983, Andhra Pradesh Agricultural University, Hyderabad, Andhra Prdesh, India. Patancheru,Andhra Pradesh, India: ICRISAT. 12 pp. 19 ref. (Limited distribution).

This paper reviews the reports on the extent of avoidable grain losses due to sorghum midge, head bugs, and head worms. Various methods to estimate crop losses due to head pests are discussed.

0898 LIMONTI, M.R., VULLATA, C.A., and JUAREZ BELTRAN, A. 1983. New pest in sorghum and maize (Zea mays) crops in the Cordoba Province (Argentina). (Es). Page 131 In Resumenes, 5. Jornadas Fitosanitarias Argentinas, 7-9 September 1983, Rosario, Santa Fe, Argentina. Rosario, Santa Fe, Argentina: Universidad Nacional de Rosario.

0899 MOTE, U.N. 1983. Relative damage due to major pests and losses caused by them on kharif, ratoon and rabi sorghum. Pesticides 17(1): 19-20. 8 ref.

Field trials were conducted in 1979-80 in Maharashtra, India to estimate losses caused by shootfly, stem borer and midge on sorghum under protected and unprotected conditions by adopting recommended control measures. The shootfly incidence was severe and caused substantial loss of grain and fodder in unprotected plots than in the protected ones.

0900 MOTE, U.N. 1983. Sources of multiple resistance to shootfly, stem borer and midge in different sorghum species. Tropical Plant Science Research 1(3): 275-276.

0901 MOTE, U.N., and BAPAT, D.R. 1983. Evaluation of some sorghum genotypes for multiple resistance to shootfly and stem borer. Journal of Maharashtra Agricultural Universities 8(2): 151-153. 12 ref.

Sixteen varieties were tested for their multiple resistance to Atherigona soccata and Chilo partellus in Maharashtra, India. Amongst the derived genotypes, E-303, E-501, E-502, E-503, E-601 and E-641 were moderately resistant to both shootfly and stem borer. Their yield components like maturity, height, thousand grain weight etc., were also encouraging and some of these lines were superior to high yielding varieties. The released high yielding variety SPV-102 was also moderately resistant to shootfly while, IS-5490 was highly resistant to shootfly.

0902 MOTE, U.N., SHIROLE, S.M., and MURTI, T.K. 1983. Field evaluation of some sorghum selections for multiple resistance to shootfly and stem borer. Journal of Maharashtra Agricultural

Universities 8(3): 278-279. 5 ref.

Eighteen and 15 lines were tested at Maharashtra, India during 1977-78 and 1978-79, respectively. Data of 1977-78 revealed that all selections tested were promising to shootfly resistance. The stemborers incidence was very low and sporadic and 7 selections were free from stemborers attack. Aispuri was the most promising. In 1978-79, IS-5490 was the most promising. All entries tested were also promising to shootfly resistance. Five selections were free from stemborer attack.

0903 NIGERIA:INSTITUTE FOR AGRICULTURAL RESEARCH. 1983. Annual report of the Institute for Agricultural Research, Ahmadu Bello University 1981-82 (year ending 31st March 1982). Samaru, Zaria, Nigeria: Institute for Agricultural Research. 74 pp.

The report includes the research on the insect pests of sorghum and their control.

0904 PAWAR, C.S. 1983. Cropping entomology: report of work 1982-83. Patancheru, Andhra Pradesh, India: ICRISAT. 21 pp. (Cropping Systems (Entomology) Progress Report no. 10). (Limited distribution).

On-farm research efforts of ICRISAT, India on the effective and economic pest management in sorghum and other crops grown under Vertisols watershed technology scheme are described. Pests and parasitoids were monitored in intercrop studies. The effects of environmental factors were also analysed in tight trap studies.

0905 PURI, S.N. 1983. A review of twenty five years of entomological research on sorghum in Maharashtra (1958-1983). Research Bulletin of Marathwada Agricultural University 7(1): 1-22. 145 ref.

The review emphasizes the development on biology, bionomics and cultural, biological and chemical control of sorghum pests in Maharashtra, India.

0906 REED, W., REDDY, K.V.S., LATEEF, S.S., AMIN, P.W., and DAVIES, J.C. 1983. Contribution of ICRISAT to studies on plant resistance to insect attack. Pages 439-449 In Natural products for innovative pest management (Whitehead, D.L., and Bowers, W.S., eds.). Oxford, UK: Pergamon Press.

This paper presents a summary of the progress of ICRISAT's studies on plant resistance to insect attack on its target crops. On sorghum, progress in screening for resistance to shootfly (Atherigona soccata), a stem borer (Chilo partellus), midge (Contarinia sorghicola), and a head-bug (Calocoris angustatus) is described.

0907 REYES, R., ANDREWS, K.L., CHENG, P.C., and GARCIA, F.A. 1983. A manual applicator of granulated insecticides; efficiency in the control of Spodoptera frugiperda (J.E. Smith) and Diatraea spp. with phoxim in sorghum, Sorghum bicolor in El Salvador, C.A. (Es). Turrialba 33(4): 375-379. 4 ref. (Summary:En).

Spodoptera frugiperda was effectively controlled in sorghum by application to the whorl of 0.04 to 0.07 g of phoxim 2.5 G. Control was unsatisfactory when the granules were applied only to those whorls which showed symptoms of recent attack. Application to all whorls resulted in satisfactory control of Diatraea spp. The use of a simple, inexpensive hand held bamboo applicator prevented direct contact with the insecticide, and

permitted rapid, precise and economical application of low dosages of the granules. Directions and illustrations for construction are given.

0908 SACHAN, G.C., and RATHORE, Y.S. 1983. Studies on the complete protection of sorghum crop against insect pests by chemicals and thuricide at various stages of crop growth. Pesticides 17(6): 15-16. 5 ref.

In completely protected crop the application of phorate 10G @ 1.5 Kg a.i./ha (before sowing for seedling stage) followed by carbaryl 4G 0.6 Kg a.i./ha in leaf whorl (at growth period), 25, 40, 50 and 60 days after germination and carbaryl 50 WP @ 0.8 Kg a.i./ha at flowering stage, gave maximum yield, more than 126 per cent as compared to completely unprotected one. Thuricide @ 1 kg/ha was less effective than carbaryl in protecting the crop against stem borer and insects attacking on earhead.

0909 SANKARAM, A.V.B., MARTHANDAMURTHI, M., BHASKARAIAH, K., SUBRAMANYAM, M., SULTANA, N., SHARMA, H.C., LEUSCHNER, K., KANNAN, K., and JOHNSON, R.E.C. 1983. Structure and biological activity of Vepaol, a new terpenoid from Azadirachta indica. Presented at the International Conference on Regulation of Insect Reproduction by Natural Products, 29 September - 1 October 1983, Regional Research Laboratory, Jammu, India. Patancheru, Andhra Pradesh, India: ICRISAT. (Limited distribution).

0910 SHARMA, H.C., and LEUSCHNER, K. 1983. Insect antifeedants and growth inhibitors from Azadirachta indica. Presented at the Second International Neem Conference, 25-28 May 1983, Rauish-Holzhausen Castle, Gissen, Federal Republic of Germany. Patancheru, Andhra Pradesh, India: ICRISAT. 22 pp. 33 ref. (Limited distribution).

The effectiveness of the fraction 'G' obtained from neem seeds against the third instar larvae of Mythimna separata was confirmed. The neem sprays reduced the insect numbers and damage caused by shootbug, headbugs and thrips. There was no apparent effect on shootfly, aphids and midge. Neem extractants were repellent to Apanteles ruficrus, a parasite of M. separata. But there was no effect of neem sprays on the midge parasite, Tetrastichus sp. and the midge predator, Orius sp.

0911 SHARMA, H.C., TANEJA, S.L., and LEUSCHNER, K. 1983. Screening sorghums for resistance to insect pests. Presented at the All India Coordinated Sorghum Improvement Workshop, 18-21 April 1983, Haryana Agricultural University, Hisar, India. Patancheru, Andhra Pradesh, India: ICRISAT. 24 pp. 38 ref. (Limited distribution).

An overview of the state of the art of the sorghum insect studies on the population monitoring and host plant resistance at ICRISAT, India is provided.

0912 TEETES, G.L., REDDY, K.V.S., LEUSCHNER, K., and HOUSE, L.R. 1983. Sorghum insect identification handbook. (Es). Patancheru, Andhra Pradesh, India: ICRISAT. 124 pp. (Boletin de Informacion no. 12).

There are 6 sections: soil insects, foliage, stem and head feeders, predators and parasites, and storage insects. The distribution, attack symptoms, identification characters, biology and the methods for controlling each pest is described along with 59 colour illustrations.

0913 TEETES, G.L., REDDY, K.V.S., LEUSCHNER, K., and HOUSE, L.R. 1983. Sorghum insect identification handbook. (Fr). Patancheru, Andhra Pradesh, India: ICRISAT. 124 pp. (Bulletin d'Information no. 12).

There are 6 sections: soil insects, foliage, stem and head feeders, predators and parasites, and storage insects. The distribution, attack symptoms, identification characters, biology and the methods for controlling each pest is described along with 59 colour illustrations.

0914 TEETES, G.L., REDDY, K.V.S., LEUSCHNER, K., and HOUSE, L.R. 1983. Sorghum insect identification handbook. Patancheru, Andhra Pradesh, India: ICRISAT. 124 pp. (Information Bulletin no. 12).

There are 6 sections: soil insects, foliage, stem and head feeders, predators and parasites, and storage insects. The distribution, attack symptoms, identification characters, biology and the methods for controlling each pest is described along with 59 colour illustrations.

0915 VAN RENSBURG, G.D.J., and MALAN, E.M. 1983. Control of sorghum pests and phytotoxic effect of carbofuran on five hybrids of grain sorghum. Phytophylactica 14(4): 159-163. 17 ref.

Carbofuran 10% granules applied to the soil for the control of sorghum pests resulted in significant reductions of infestations of Rhopalosiphum maidis, Melanaphis sacchari, Anatrichus erynasius, and Busseola fusca. Symptoms of phytotoxicity occurred. Five sorghum hybrids differed in susceptibility to the phytotoxic effect of carbofuran, but the differences were very small. Phytotoxicity was more severe in soil with a low clay content, than in soil with a high clay content. Drought stress also seemed to increase the phytotoxicity of carbofuran.

0916 WALKER, P.T. 1983. Assessment of crop losses in cereals. Insect Science and its Application 4(1-2): 97-104. 80 ref.

The reasons for assessing crop losses due to pests of cereals including sorghum are reviewed; for making decisions in pest management based on costs and benefits, for allocating resources on the most important pests, and as a guide to how yield is lost. Crop yield is seen as a balanced system, with inputs and output. The methods of quantifying pest attack, measuring losses and the difficulties met are discussed; the interaction of losses, interplot interference, mixed crops, loss distribution and crop compensation. Surveys of loss are described, with examples.

0917 WISEMAN, B.R., WIDSTROM, N.W., and SKINNER, J.L. 1983. Evaluation of grain sorghum hybrids for insect resistance. Research Report, Georgia Agricultural Experiment Stations 422: 60-62.

Evaluations for insect resistance and other traits of early and late season sorghum hybrids at Tifton, Georgia for 1982 are expressed as visual damage ratings with the help of two tables. Since the midge damage is the most important, it is given more weight in calculating the overall resistance performance.

Soil Pests

0918 FOUGEROUX, A. 1983. The

control of soil pests in field crops. (Fr). Phytoma 346: 56-57.

The assessement of damage, the development and cultural and chemical control of soil pests of sorghum in France are outlined.

Other Insect Pests

0919 AMOAKO-ATTA, B. 1983. Observations on the pest status of the striped bean weevil Alcidodes leucogrammus Erichs. on cowpea under intercropping systems in Kenya. Insect Science and its Application 4(4): 351-356. 20 ref.

The pest status is studied in maize-cowpea-sorghum intercropping combinations. Sorghum-cowpea intercropping had significantly fewer weevils due to the close spacing and tillering capacity of the sorghum crop which prevented the weevil migration between rows.

0920 ECUARE, S. 1983. Contribution to the study of the evolution of the fauna of grasshoppers on sorghums and maize in the experimental perimeter of Katibougou [Mali]. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 60 pp.

0921 GAHUKAR, R.T., and PIERRARD, G. 1983. Chafer beetles as a pest of sorghum and pearl millet. FAO Plant Protection Bulletin 31(4): 168-169. 3 ref.

A field trial was carried out in Bambey, Senegal to assess the effect of a specific level of beetle Rhinyptia infuscata population on sorghum yield. The pest could cause serious damage to sorghum if beetle emergence coincided with the flowering period.

0922 HODGES, R.J., DUNSTAN, W.R., MAGAZINI, I,, and GOLOB, P. 1983. An outbreak of Prostephanus truncatus new record Coleoptera Bostrichidae in East Africa. Protection Ecology 5(2): 183-194.

0923 MOTE, U.N. 1983. Epidemic of delphacids and aphids on winter sorghum. Sorghum Newsletter 26: 76.

There was an unusual epidemic of Peregrinis maidis in Maharashtra, India in the winter season of 1981-82. Due to increasing night temp. and low humidity between October to December, delphacid density increased ranging from 200 to 300/plant. Due to the heavy infestation crop growth was affected drastically. The density of delphacids declined in areas where rains were received. However, due to cloudy weather, a rise in temp. and humidity, the aphid Aphis sacchari increased in density and crops were severely affected.

0924 MOTE, U.N. 1983. Unusual occurrence of Pyrilla on winter sorghum. Sorghum Newsletter 26: 75.

Pyrilla perpusilla, a major pest of sugarcane occurred in epidemic forms on winter sorghum in the sugarcane belt of Maharashtra, India. The pest occurred from October to early December in greater magnitude. The peak density was in November. The insects sucked the cell sap from the lower surface of the leaves and secreted honey dew like substance that spread on upper surface of leaves on which a black sooty fungus developed which affected the photosynthesis and yield adversely.

0925 OTTENS, R.J., and HERZOG, G.A. 1983. Survival of whitefringed beetle larvae, Graphognathus peregrinus, on a

variety of greenhouse potted plants. Journal of the Georgia Entomological Society 18(1): 461-463. 6 ref.

Sorghum is one of the greenhouse potted plants studied. Number of larvae recovered, % survival and total larval biomass produced/pot were recorded. Sorghum showed high survival rate, but average larval biomass was substantially lower than that produced by peanuts or sweet potatoes.

0926 PETERS, L.L. 1983. Chinch bug (Heteroptera: Lygaeidae) control with insecticides on wheat, field corn, and grain sorghum, 1981. Journal of Economic Entomology 76(1): 178-181. 7 ref.

Field-plot tests were carried out in Nebraska, USA in 1981 on the effectiveness of several insecticides for the control of Blissus leucopterus leucopterus (Say) on wheat, maize and sorghum. In-furrow applications of granules or sprays of either carbofuran or carbosulfan at 0.11-0.22 g a.i./m at planting produced the largest plant stands of sorghum.

0927 RIOS DE SALUSO, M.L.A., CONDE, A.A., and SILVERO SAÑZ, O.I. 1983. Damages caused by Nezara viridula to grain sorghum during the stage of reproduction of the crop. (Es). Serie Tecnica, Estacion Experimental Regional Agropecuaria Parana (Argentina) no. 52. 12 pp. 10 ref. (Summary:En).

0928 SINGH, O.P., DHAMDHERE, S.V., and MISRA, U.S. 1983. Outbreak of rice grasshopper Hieroglyphus banian (Acrididae Orthoptera) in northern Madhya Pradesh, India. Agricultural Science Digest 3(2): 92-94.

0929 VAN RENSBURG, G.D.J. 1983. Laboratory observations on the biology of Cicadulina mbila (Naude) (Homoptera: Cicadellidae), a vector of maize streak disease. 2. The effect of selected host plants. Phytophylactica 14(3): 109-111. 12 ref.

Cicadulina mbila females laid significantly more eggs on pearl millet than on oats, maize, wheat and grain sorghum. More eggs were laid on the leaf-blades of host plants, than on the leaf-sheaths. The maize leafhopper completed its life-cycle significantly quicker on grain sorghum and pearl millet than on wheat, maize and oats. C. mbila preferred to feed on wheat to all the other host plants tested. Pearl millet was more favourable for the development of C. mbila than any of the other host plants.

0930 VYAS, N.R., SINGH, O.P., DHAMDHERE, S.V., and MISRA, U.S. 1983. An unusual outbreak of the rice grasshopper, Hieroglyphus banian Fabricius and its host preference. Journal of Entomological Research 7(2): 194-195. 4 ref.

An unusual outbreak of the rice grasshopper, Hieroglyphus banian occurred during the rainy season in Gwalior, Madhya Pradesh, India. The pest severely damaged sorghum fodder crop in an area of 10 hectares. Eleven alternate hosts belonging to three families were recorded. Sorghum crop was the most preferred followed by maize and pearl millet. The probable reasons attributed for the outbreak were prevalence of severe drought due to scanty rainfall received during June (40.9 mm) and July (38.1 mm) 1979. Heavy rains during June (81.9 mm) and July (289.5 mm) accelerated hatching of such eggs resulting in abnormal build-up in pest population.

0931 WOODHEAD, S. 1983. Surface chemistry of Sorghum

bicolor and its importance in feeding by Locusta migratoria. Physiological Entomology 8(3): 345-352. 26 ref.

Seedling of sorghum was rejected at palpation by nymphs of Locusta migratoria L. unless the surface wax was removed. The wax by itself was unpalatable, and when fractionated chromatographically into constituent chemicals its deterrent effects were attributable to the p-hydroxybenzaldehyde, n-alkane, and ester fractions. Analysis of these last two fractions showed that they were unusual in that the carbon chain lengths of the molecules were shorter than expected. These smaller molecules (tested as pure chemicals) were repellent to L. migratoria. The short-chain esters are more volatile than the ineffective longer-chain ones, and it is proposed that the insect may detect these chemicals by short-range olfaction and hence reject the plant before biting, thus imparting a more effective defence to the plant.

0932 WRIGHT, V.F., and BURROUGHS, R. 1983. Mold-damaged grain sorghum as a diet for three stored-grain beetles (Coleoptera). Environmental Entomology 12(2): 558-560. 7 ref.

Three species of stored-grain beetles, Tribolium castaneum, Cynaeus angustus, and Cryptolestes pusillus, were reared on flours prepared from grain sorghum stored with increasing levels of moisture, and therefore, different degrees of invasion by storage molds. Flours from sorghum molded by the Aspergillus glaucus group and by the A. candidus group were better growth media for all beetles than flour from the sorghum control. Grain additionally invaded by Penicillium citrinum Thom inhibited growth of T. castaneum and caused 100% mortality in C. pusillus but supported larval growth of C. angustus as well as the control. Reproduction of T. castaneum was enhanced on all mold-damaged flours; progeny per female of C. pusillus increased on flours supporting increased larval size.

Aphids

0933 ARCHER, T.L., and BYNUM, E.D., JR. 1983. Influence of sorghum leaf area on greenbug densities and damage. Sorghum Newsletter 26: 80.

Greenbug densities and damage were determined on 6 sorghum varieties with varying leaf areas. Greenbug densities and damage were not related to leaf area.

0934 BALETKA, A.D., and CASTELLANO, S.R. 1983. Levels of greenbug (Schizaphis graminum Rond.) resistance in cultivars of commercial grain sorghum. Sorghum Newsletter 26: 71.

Out of the 42 cv. tested at Manfredi Agricultural Experiment Station, Argentina cultivars BR 64 R +, WAC 652, GA 430 RP, and 4000 R were found to be greenbug resistant.

0935 BARBULESCU, A. 1983. New elements in the control of aphids affecting sorghum. (Ro). Productia Vegetala Cereale si Plante Tehnice 35(1): 24-26.

0936 BERGER, P.H., TOLER, R.W., and HARRIS, K.F. 1983. Maize dwarf mosaic virus transmission by greenbug biotypes. Plant Disease 67(5): 496-497. 9 ref.

A new biotype (biotype E) of the greenbug, Schizaphis graminum, was compared with biotype C as a vector

of the A and B strains of maize dwarf mosaic virus (MDMV-A and DMMV-B). Two isolates of MDMV-A and one isolate of MDMV-B were tested. Biotype E was more efficient than biotype C as a vector of one MDMV-A isolate. Biotype E greenbugs were more efficient than biotype C as vectors of MDMV-B.

0937 CAMPBELL, B.C., and NES, W.D. 1983. A reappraisal of sterol biosynthesis and metabolism in aphids. Journal of Insect Physiology 29(2): 149-156. 39 ref.

Aphids of Schizaphis graminum (Rondani) (biotype C) reared on its host-plant, Sorghum bicolor (L.) Moench, sequestered campesterol, stigmasterol and sitosterol. Aphids reared for 72 hr on holidic diets supplemented with [4-14 C] sitosterol contained both [14C]-sitosterol and [14C]-cholesterol, indicating that these aphids are capable of dealkylation at C-24. When aphids were reared on artificial diets containing [2-14 C]-mevalonic acid, no detectable amounts of radioactively labelled desmethyl sterols, nor metabolic intermediates in sterol synthesis (i.e., squalene, 2,3-oxidosqualene, 4,4-dimethyl and 4-monomethyl sterols) were found to accumulate in their tissues. The relevance of these findings to previous research suggesting the ability of aphids, via their symbiotes, to synthesize sterols is discussed.

0938 GILSTRAP, F.E., BROOKS, G.W., and KRING, T.J. 1983. Status of greenbug biological control in Texas sorghum. Miscellaneous Publication, Texas Agricultural Experiment Station no. 1538. 4 pp. 22 ref.

A survey of sorghum aphid parasites in 44 major sorghum-producing counties of Texas revealed the general occurrence of the primary parasites Lysiphlebus testaceipes, Aphelinus nigritus, and Diaeretiell rapae, and the secondary parasites Alloxysta sp. Pachyneuron siphonophorae, Aphidencyrtus aphidivorus, Asaphes lucens, and T. minutus attacking greenbug, Schizaphis graminum, or corn leaf aphids, Rhopalosiphum maidis. Of six exotic species of biological control agents released since 1969 in Texas and Oklahoma, none were recovered during the survey. A substantially higher level of parasite emergence was realized in this versus previous surveys, possible due to the procedure of collecting aphid mummies intact with the leaf substrate.

0939 KADAM, J.R., and MOTE, U.N. 1983. Evaluation of some sorghums for corn leaf aphid resistance. Sorghum Newsletter 26: 74.

Thirty-four varieties and 14 hybrids were evaluated for their resistance to the corn leaf aphid, Rhopalosiphum maidis at Maharashtra, India. The entries were visually rated 40 days after germination for relative aphid density and 60 days for aphid injury. Aphid density was rated 1 to 5, with 1=no aphid and 5=heavy density. Plant injury was rated 0 to 9 where 0=no injury and 9=severe injury.

0940 KOJIMA, M., MATSUBARA, A., YANASE, S., and TORIYAMA, S. 1983. The occurrence of barley yellow dwarf disease in Japan. Annals of the Phytopathological Society of Japan 49(3): 338-346.

0941 KULKARNI, K.A., and BHUTI, S.G. 1983. Grain weight loss in sorghum due to sorghum earhead bug (Calocoris angustatus). Sorghum Newsletter 26: 73.

The weight of earheads indicated that there was 6.1% loss in SB 1079, 21.5% loss in CSH-5 and 31.7% loss in SB 905. Grain weight of 10 earheads revealed that there was 17.9% loss in SB 1079, 25.7% loss in CSH-5 and 57.1% loss in SB 905. SB 1079 was less damaged than SB 905 by the earhead bug due to its thicker epidermal layer.

0942 MONTLLOR, C.B., CAMPBELL, B.C., and MITTLER, T.E. 1983. Natural and induced differences in probing behavior of two biotypes of the greenbug, Schizaphis graminum, in relation to resistance in sorghum. Entomologia Experimentalis et Applicata 34(1): 99-106. 21 ref.

The probing behavior of biotypes GBE and GBC was electronically monitored on IS 809. Aphids of GBE established committed phloem ingestion (CPI) in a significantly shorter amount of time than did aphids of GBC. The total duration of phloem ingestion during a 24 hr period was significantly longer for GBE than for GBC. Once CPI was initiated, aphids of both biotypes tended to ingest for long periods from the phloem of IS 809 during the 24 hr assay. Further experiments showed that GBC exposed to IS 809 for at least 24 hr prior to being monitored on this variety also reached the phloem faster, established CPI sooner, and spent longer feeding from the phloem than did GBC without previous exposure to this variety. The significance of these findings towards an understanding of the mechanism of resistance of IS 809 to GBC and to the breakdown of this resistance to GBE is discussed.

0943 PAUL, M.D., RAO, D.V.S., and NARAYANA, K.L. 1983. Evaluation of insecticides as sprays and dusts for the control of sorghum earhead bug (Calocoris angustatus L.). Indian Journal of Plant Protection 11(1-2): 13-16. 7 ref.

Trials were conducted during 1975-1978 at Andhra Pradesh, India to determine the relative efficacy of different insecticides as sprays and dusts. The results indicated that the insecticides viz., phenthoate dust at 1.5 kg a.i./ha, chlorpyriphos spray at 0.3 kg a.i/ha, carbaryl dust at 1.5 kg a.i/ha, malathion dust at 1.5 kg a.i./ha and quinalphos dust at 0.375 kg a.i/ha were found highly effective against the earhead bug. Other effective insecticides were 1 eptophos spray at 0.5 a.i/ha and carbaryl spray at 1.5 kg a.i/ha. The efficacy of the insecticides viz., quinalphos spray, endosulfan spray, diazinon spray, endosulfan dust and BHC dust was found to be intermediary. The insecticides found less effective were pyrocolloid, phosalone and DDVP sprays. Dust formulation was found superior to spray formulation of the same insecticide.

0944 STARKS, K.J., BURTON, R.L., and MERKLE, O.G. 1983. Greenbugs (Homoptera: Aphididae) plant resistance in small grains and sorghum to biotype E. Journal of Economic Entomology 76(4): 877-880. 16 ref.

During the winter of 1979-1980, a new biotype of the greenbug, biotype E, was reported at Texas, USA. The reactions of various host plants to this greenbug were tested by measuring one or more of the mechanisms of host plant resistance. Commercial grain sorghum lines previously resistant to greenbug were found susceptible, but 'PI220248,' 'PI264453,' and 'Capbam' indicated a useable level of resistance to biotype E. Bloomless (bm bm) appeared to maintain its resistance, and was effective against biotype E. In general it was considered that the

occurrence of the new biotype has affected many of the previous resistant genotypes that had been developed in small grains and sorghum.

0945 SUMMY, K.R., and GILSTRAP, F.E. 1983. Facultative production of alates by greenbug and corn leaf aphid, and implications in aphid population dynamics (Homoptera: Aphididae). Journal of the Kansas Entomological Society 56(3): 434-440. 15 ref.

Studies of biotype-C greenbug (Schizaphis graminum), and corn leaf aphid, (Rhopalosiphum maidis), suggested a two-fold impact of facultative alate production: (1) a significant role of alate emigration in the numerical decline of both aphid species on sorghum, and (2) removal of significant number of immature primary parasites via alate greenbugs. The implications of these results in interpretation of aphid population dynamics and impact of natural enemies are discussed.

Shoot Fly

0946 BAPAT, D.R., and MOTE, U.N. 1983. Sources of shootfly resistance in sorghum. Journal of Maharashtra Agricultural Universities 7(3): 238-240. 13 ref.

Sixty seven lines composing of 57 species, local varieties and checks were screened for resistance to shootfly in rainy seasons of 1978 and 1979 under severe natural field infestation at Rahuri, India. Three species viz., S. versicolor, S. purpureosericeum and a wild species were observed to be immune to shootfly infestation and damage, since neither eggs nor dead hearts were noticed in both the years. Similarly, some of the tolerant types having desirable grain and plant type were also isolated. These could profitably be used in appropriate breeding programmes. The three immune species are reported for the first time, which provide additional source of resistance, which could be pyramided over the tolerant types possessing desirable grain and plant type. Morphological characters like leaf colour and hairiness (trichomes) were related to non preference for oviposition, as a mechanism of resistance and these could also be used as a screening tool.

0947 BHUTI, S.G., and KULKARNI, K.A. 1983. OK-174 seed treatment for sorghum shootfly control. Sorghum Newsletter 26: 73.

Results indicated that the least incidence of deadheart occurred in the carbofuran 3 G treated plots and was highest in the monocrotophos G. 1.5 gm/m treated plots. The best treatment was followed by carbofuran seed dress and OK-174 seed dress. These 3 treatments resulted in similar levels of control and were significantly more effective than the other treatments.

0948 BONZI, S.M., and GAHUKAR, R.T. 1983. Distribution of the populations of Atherigona soccata Rondani (Diptera, Muscidae) and allied species during the rainy season in Upper Volta. (Fr). Agronomie Tropicale 38(4): 331-334. 7 ref.

Fish meal was used as bait for Atherigona soccata Rond. and related species on sorghum in Burkina Faso during the rainy season. The adults were active in August-September, and the number of males caught in traps in 1978-80 represented 4-43% of the total adult population of both sexes.

Males of 24 species of Atherigona were identified. Atherigona marginifolia Emd. was the most abundant species, forming 36% of the total population, whereas A. soccata formed only 14%.

0949 BORIKAR, S.T., CHUNDURWAR, R.D., and CHOPDE, P.R. 1983. Genetic variability for shootfly resistance in sorghum. Journal of Maharashtra Agricultural Universities 7: 223-225. 7 ref.

The genetic variability for shootfly resistance was assessed under 3 levels of shootfly infestation in F1 and F2 generations of inter-varietal crosses of sorghum. The mean values for seedling mortality and oviposition increased with increase in shootfly population. The estimates of genotypic coefficients of variability, heritability and genetic advance were higher for both the traits when material was tested under optimum shootfly population. Shootfly tolerant genotypes can be selected by growing the breeding material under optimum shootfly population as indexed by 67 to 70 per cent seedling mortality and 1 to 2 eggs/plant on susceptible check.

0950 CHUNDURWAR, R.D., and BORIKAR, S.T. 1983. Stability analysis for shootfly resistance in sorghum. Page 5 In National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Coimbatore, Tamil Nadu, India. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

0951 CHUNDURWAR, R.D., and KALYANKAR, S.P. 1983. Correlation and regression between percentage deadhearts by shootfly and grain yield in sorghum. Sorghum Newsletter 26: 76.

Trials were conducted to obtain yield losses at various levels of shootfly damage to CSH-1, Swarna and PVK-9 (SPV-297) sorghum. The correlation co-efficient was significant and negative between infestation and yield for genotypes tested. The regression co-efficients indicated that the yields of sorghum were influenced by variation in infestation levels for genotypes studied.

0952 CHUNDURWAR, R.D., KADAM, B.B., and BORIKAR, S.T. 1983. Infestation levels of shootfly (Atherigona soccata Rondani) and its relation to yield of sorghum. Sorghum Newsletter 26: 77-78.

The effects of different levels of shootfly damage were highly related to grain yield. The treatment of 100% carbofuran treated seed resulted in the highest grain yield and was similar to 90% and 75% treated seed. The grain yield in the control plots was the lowest and similar to the grain yield in 10 and 25% treated seed plots.

0953 DELOBEL, A.G.L. 1983. Humidity effects on Atherigona soccata egg development and hatch. Entomologia Experimentalis et Applicata 33(3): 269-275. 28 ref.

0954 DELOBEL, A.G.L. 1983. Influence of temperature and host plant condition on preimaginal development and survival in the sorghum shootfly Atherigona soccata. Insect Science and its Application 4(4): 327-335. 32 ref.

Temperature-time and temperature-velocity equations are given for egg, larval and pupal stages of Atherigona soccata. Preimaginal development (from egg deposition to adult emergence) on sorghum CSH-1 seedlings lasted

19.5, 26.3, 33.8 and 76.8 days at 30, 25, 20 and 15 deg C, respectively. The sorghum shootfly showed optimal development and survival at 30 deg C. Lower threshold temperatures were 13.8, 10.2 and 11.8 deg C for the egg, larva and pupa, respectively. Host plant condition affected larval development and survival. Pupal weight was higher and larval mortality lower in insects reared on fertilized and normally watered seedlings than on unfertilized and water stressed seedlings.

0955 DELOBEL, A.G.L., and UNNITHAN, G.C. 1983. Effect of constant temperatures on the characteristics of populations of Atherigona soccata (Diptera Muscidae). (Fr). Acta Oecologica, Oecologia Applicata 4(4): 351-368. 51 ref. (Summary:En).

The development of Atherigona soccata was studied in the laboratory on sorghum; the basic population parameters, such as rm (the intrinsic rate of natural increase), Ro (the net reproduction rate) and Tm (the mean generation time), were assessed at different constant temperatures. The relationship between temperature and rate of development was sigmoidal. Temperature significantly affected population growth potential: the lower threshold for population increase was determined to be 16.3 deg C; rm reached a maximum slightly above 30 deg C, and the upper threshold, which was not assessed precisely, was reached when temperature adversely affected host plant development, that is between 30 and 35 deg C.

0956 GANDHALE, D.N., SALUNKHE, G.N., and NAIK, L.M. 1983. Incidence of shootfly as influenced by sowing time and seed rates of sorghum. Journal of Maharashtra Agricultural Universities 8(3): 294-295. 10 ref.

A field trial was conducted during kharif season of 199 at Pune, India by keeping 5 sowing dates and 3 seed rates replicated thrice in a factorial randomised block design. The pest incidence was less in the earlier sowings. The effect of seed rates on pest incidence was non-significant.

0957 GIBSON, P.T., and MAITI, R.K. 1983. Trichomes in segregating generations of sorghum matings. 1. Inheritance of presence and density. Crop Science 23(1): 73-75. 19 ref.

The presence of trichomes on the leaves of sorghum is associated with reduced susceptibility to shootfly attack. Segregation ratios in successive generations of single-cross matings between trichomed and trichomeless parents indicated that the presence of leaf-blade trichomes is recessive and controlled by a single locus. Inheritance of the trichome trait in 3 matings among 4 trichomed parents involved the same locus. The symbol tr is proposed for the gene controlling trichome presence. Trichome density on the abaxial leaf lamina varied among trichomed lines derived from single-cross matings. Standard unit heritability for F4, on F3, estimated only in the cross IS 1054 x BCK60, was 0.75 on a plot basis.

0958 HALALLI, M.S., GOWDA, B.T.S., KULKARNI, K.A., and GOUD, J.V. 1983. Evaluation of advanced generation progenies for resistance to shootfly in sorghum. Indian Journal of Genetics and Plant Breeding 43(2): 291-293. 2 ref.

Advanced generation material was evaluated to estimate the extent of variability, heritabililty and genetic advance. F3's were more variable and F4's the least, for

egg count/plant and dead hearts (%). Back cross F3's were comparatively more resistant. Five (BC) F3 progenies, one F3 progeny and three F4 progenies were more resistant than the highly resistant parent, IS 5604, suggesting transgressive inheritance of the character. Broad sense heritability was around 30 per cent indicating greater influence of environment.

0959 JADHAV, G.D., and JOTWANI, M.G. 1983. Efficacy of carbofuran and isofenphos against the sorghum shoot fly, Atherigona soccata (Rond.), in different soil types. Journal of Entomological Research 7(1): 1-5. 3 ref.

Trials were conducted to determine efficacy of carbofuran and isofenphos for the control of sorghum shoot fly, by applying the insecticides in 7 different soil types. Carbofuran treatments were found to be superior to isofenphos. Efficacy of both the insecticides was significantly affected depending on the soil type. High pH of soil showed maximum adverse effect. Response of isofenphos seed treatment was slightly different from carbofuran seed and granular treatments in different soils.

0960 KADAM, J.R., and MOTE, U.N. 1983. Recovery resistance against shootfly in sorghum. Sorghum Newsletter 26: 75.

Most of the entries, except IS-5490 exhibited high levels of susceptibility to shootfly under severe infestation conditions. There was no correlation between shootfly resistance and recovery, indicating independent genetic control. Some entries showed high susceptibility in the initial stage, but possessed high recovery resistance, which was reflected in grain yield.

0961 KADAM, J.R., MOTE, U.N., and BAPAT, D.R. 1983. Effect of sowing dates and carbofuran seed treatment on recovery of shootfly infested plants. Sorghum Newsletter 26: 74.

The data indicated that late planted and untreated sorghum had low recovery of shootfly infested plants compared to early planted and treated sorghum. The carbofuran treated crop produced 50% more grain yield over the untreated crop. The early sown crop produced 127% more grain yield than the late sown crop.

0962 KISHORE, P., KHAN, N.H., and GOVIL, J.N. 1983. Non insecticidal input for insect pest management in sorghum to avoid environmental pollution by toxicants. Indian Journal of Agricultural Research 17(1-2): 69-72. 4 ref.

Nine high yielding cultivars in advance generations of testing were grown alongwith susceptible check CSH-1 over two years (1980-81) to confirm resistance shown by them in previous years against shootfly and stem borer. The cv. possessed moderate level of resistance to both the pests and gave good yields. These cultivars did not require the use of insecticides at moderate levels of pest infestations.

0963 KULKARNI, K.A. 1983. Optimum dose of carbofuran granules for the control of sorghum shootfly (Atherigona soccata Rondani). Mysore Journal of Agricultural Sciences 17(2): 129-130. 2 ref.

0964 MAITI, R.K., and GIBSON, P.T. 1983. Trichomes in segregating generations of sorghum matings. II. Association with shootfly resistance. Crop Science 23(1): 76-79. 18 ref.

Trichomed, segregating, and trichomeless F2-derived lines in the F3 and F4 from 4 trichomed x trichomeless sorghum matings and their parents were studied at ICRISAT Center, India. Trichomed lines had significantly lower percentages of plants with shootfly eggs 18 days after emergence and of deadhearts at both 18 and 23 or more days after emergence. The ratio of the difference between the means of trichomed and trichomeless lines for the percentage of deadhearts to the corresponding difference between the parents ranged from 0.16 to 0.92 and exceeded 0.32 in 7 of 9 comparisons. Thus, trichomes were clearly a major factor involved in resistance. Means of the parents and trichomed, segregating, and trichomeless offspring were regressed on four possible genetic models. The results indicated that at least 2 additional loci that interact with each other were involved in resistance. Trichome density was examined as a possible factor in resistance, but correlation of deadheart percentage with the density of trichomes was low and nonsignificant.

0965 MALI CHANAPHONG, KRIANGKAI CHAMROENMA, and BUNSOM MEKSONGSRI. 1983. Relationship between the destruction of sorghum shoot fly (Atherigona soccata) and yield of sorghum cultivar Uthong I. (Thai). Ent-Zoo News (Thailand) 5(1): 3-7.

0966 MOTE, U.N. 1983. Incidence of shootfly on early sown rabi sorghum. Pestology 7(7): 8-10.

The incidence of shootfly was more pronounced on early sown sorghum. Carbofuran seed treatment increased the yields and reduced the shootfly incidence even in the advance sowing date.

0967 MOTE, U.N. 1983. Relation between the shootfly damage and sorghum yields during rainy season. Indian Journal of Plant Protection 11(1-2): 145-147. 2 ref.

A field experiment was conducted in Maharashtra, India during 1980 to study the relationship between the dead hearts caused by shootfly and grain and fodder yield of sorghum variety CSH-5. The intensity of infestation was low, moderate, and heavy in early, normal and late sowings respectively. There was a significant negative correlation between the percentage of dead hearts and grain and fodder yields in all 3 sowing dates. For one per cent increase in dead hearts, there was a reduction of 55.22 and 42.33 kg/ha of grain and fodder yield respectively.

0968 MOTE, U.N., and BAPAT, D.R. 1983. Promising sources of shootfly resistance in sorghum. Madras Agricultural Journal 70(7): 481-484. 10 ref.

Nineteen resistant accessions and CSH-1 were studied at Maharashtra, India during 1979, 1980, and 1981. Sixteen lines were highly resistant to shootfly and stable in reaction when 3 parameters, viz., statistical analysis, resistance formula and 40% dead heart bench mark were considered.

0969 MOTE, U.N., and KADAM, J.R. 1983. Carbofuran seed treatment increases its efficacy with different level of nitrogen for the control of sorghum shootfly. Indian Journal of Plant Protection 11(1-2): 134-135. 6 ref.

A field trial was conducted under rainfed conditions using a high yielding sorghum hybrid, CSH-R at Maharashtra, India. Three levels of N and 2 treatments of carbofuran

were applied in 3 replications. Nitrogen was applied in the form of urea at the time of sowing. The shootfly damage was assessed by recording the seedlings showing dead hearts in the main shoot on 28th day after germination.

0970 MOTE, U.N., KADAM, J.R., and BAPAT, D.R. 1983. Evaluation of high yielding sorghum derivatives for resistance to shootfly. Sorghum Newsletter 26: 30.

Three sets of entries from advanced breeding material along with checks were tested at Rahuri, India for their reaction to shootfly. In the first set of 14 entries with checks, the shootfly incidence ranged from 9.04to 79.69%. Significantly lesser dead hearts were noticed in RSV-9R. RSV-R lines and RSV-4R were comparatively resistant to shootfly and sustained less than 40% dead hearts. In the second set of 20 entries, the shootfly incidence ranged from 23.34 to 90% . None of the entries except checks showed less than 40% dead hearts. The derived line 1258 B x HD-8-36 was found to be promising. In set 3 of 40 lines, the shootfly incidence ranged from 12.42-66.24%, PS-18527, PS-14533, SPV-491, and RHR-5 were highly resistant showing less than 20% dead hearts.

0971 MOTE, U.N., KADAM, J.R., and BAPAT, D.R. 1983. Screening of new male-sterile lines for shootfly reaction. Sorghum Newsletter 26: 29.

The evidence of shootfly ranged from 20.04 to 97.37%. None of the entries showed less than 40% deadhearts. On the basis of resistance, 365A3, 367A1, and 366B4 were observed to be promising against shootfly. Next promising male-sterile lines were SPV-42-11-1A, SPV-42-8-1A, 36A, 365A, SPV-42-11-2A and 362A3, in which less than 70% deadhearts were recorded. Released hybrids like CSH-1, CSH-5, CSH-6, CSH-9, and their parents except CSH-8R were highly susceptible to this pest.

0972 NATARAJAN, K., and CHELLIAH, S. 1983. A new method to control sorghum shoot-fly. Pesticides 17(9): 37.

A hanging trap developed at ICRISAT, India and tested at TNAU, Coimbatore, India is described. Decomposing fish meal was used as bait. It was found that this trap was more efficient than pan type water trap in collecting a maximum of 342 flies/trap a day. 12 to 15 traps per hectare of sorghum fields were required for effective control of shootfly.

0973 OMORI, T., AGRAWAL, B.L., and HOUSE, L.R. 1983. Componental analysis of the factors influencing shoot fly resistance in sorghum (Sorghum bicolor (L.) Moench). JARQ 17(3): 215-218. 5 ref.

Genotypic and phenotypic correlations between shoot fly resistance and its componental characters were estimated in 2 different sets of material. Trichome intensity and glossiness intensity, showed negative and significant associations with the shoot fly resistance but did not play any direct role in building up the total variability in the shoot fly resistance. Both the correlation and path analysis showed rather dissimilar pictures of the causal system of the factor governing shoot fly resistance. It is also evident from the results of both these analyses that the major portion of the variability present in shoot fly resistance is contributed by the character: number of eggs/plant. The glossy seedling expression in sorghum can be utilized as a simple and

reliable selection criterion for shoot fly resistant plants.

0974 RAINA, A.K., and KIBUKA, J.G. 1983. Oviposition and survival of the sorghum shootfly on intercropped maize and sorghum. Entomologia Experimentalis et Applicata 34(1): 107-110. 11 ref.

The sorghum shootfly, Atherigona soccata was observed to lay eggs on maize when intercropped with sorghum. In greenhouse tests, up to 52% of the total eggs were laid on maize when it was planted 2 days after sorghum in the same hole. However, in field trials no more than 6% of the maize plants received shootfly eggs, compared to 61% of the sorghum plants. There was no difference in rate of hatch of eggs on the two host plants. Larvae fed on both host plants but caused very little damage to maize.

0975 SHAFEE, S.A., FATMA, A., and KISHORE, P. 1983. Descriptions of two new species of Tetrastichus Haliday (Hymenoptera:Eulophidae) from India. Journal of the Bombay Natural History Society 80(2): 393-396. 1 ref.

The new species Tetrastichus agarwali sp. n and Tetrastichus delhiensis sp. n. reared on Atherigona soccata infesting sorghum in New Delhi, India, in 1978 are described.

0976 SHARMA, G.C., and RANA, B.S. 1983. Resistance to the sorghum shoot fly, Atherigona soccata and selection for antibiosis. Journal of Entomological Research 7(2): 133-138. 8 ref.

Resistant sources were evaluated for the shoot fly, Atherigona soccata reaction, under late planting conditions, for 3 years. The average egg population ranged from 0.38 to 0.49 per plant in the seven lines. Significantly less number of dead hearts (14.9 to 18.5 per cent) were recorded in 6 lines. However, none of these lines showed complete non-preference to oviposition. The character, 'no dead-heart formation in spite of oviposition' was found to be heritable in F1 and F2 generations of high yielding x resistant varietal crosses. In F2 generation of R X R and S X R crosses, the percentage of such plants was 16.8 and 6.3, respectively. Thus, healthy plants with eggs can be selected in segregating generation. This may provide a criterion for transferring/strengthening antibiosis in the resistant breeding programme.

0977 SHINDE, V.K., NANDANWANKAR, K.G., and AMBEKAR, S.S. 1983. Relative susceptibility of parents of sorghum hybrids and high yielding varieties to shootfly under late-sown conditions. Sorghum Newsletter 26: 25-26.

It is recommended that for planning a foundation seed production program of 2077A and 2219A during July-August, intensive care is required to protect the male lines 2077B and 2219B against the shootfly to maintain the desired plant population.

0978 SHIVPUJE, P.R., and THOMBARE, P.A. 1983. Efficacy of different insecticides for the control of sorghum shootfly. Journal of Maharashtra Agricultural Universities 8(1): 83. 3 ref.

Eleven insecticides were tested for their efficacy in India in the kharif and rabi seasons of 1975. Carbofuran gave the best control in both seasons and gave the highest grain yield in the rabi season.

0979 SINGH, P., UNNITHAN, G.C., and DELOBEL, A.G.L. 1983. An

artificial diet for sorghum shootfly larvae. Entomologia Experimentalis et Applicata 33(1): 122-124. 5 ref.

Several combinations of shredded tissue paper, brewer's yeast, vitamin-free casein and water were evaluated. The composition of the best diet was, shredded kleenex tissue paper 50 g, vitamin-free casein 15 g, Brewer's yeast 20 g, Nipagin 0.75 g dissolved in 3 ml 75% ethyl alcohol and distilled water 200 ml.

0980 SONI, H.S., BORIKAR, S.T., and CHUNDURWAR, R.D. 1983. Gamma radiation induced variability for shootfly resistance in sorghum. Sorghum Newsletter 26: 75.

Results indicated that there was an increase in the proportion of moderately resistant progenies with an increase in the dose of gamma radiation and the possibility of inducing variability for polygenic characters like shootfly resistance.

0981 SUKHANI, T.R., and JOTWANI, M.G. 1983. Insecticidal seed soaking technique for the control of sorghum shoot fly, Atherigona soccata (Rondani). Journal of Entomological Research 6(1): 104-106. 1 ref.

Out of 18 systemic and non-systemic insecticides evaluated in a preliminary trial, only 7, viz., methidathion, chlorfenvinphos, leptophos, trichlorfon, fenthion, monocrotophos and carbofuran gave encouraging results when used @ 5 gm a.i./10 kg of seed. In the final trials, these insecticides gave effective control of the shoot fly. However, there was substantial decrease in the efficacy of all the insecticides, during 3rd week after germination. Seed soaking in chlorfenvinphos, trichlorfon and monocrotophos affected the viability of sorghum seed, while fenthion resulted in improved germination.

0982 TELI, V.S., PAWAR, M.B., and KALBHOR, S.E. 1983. Relative susceptibility of some varieties and hybrids of sorghum to shootfly. Journal of Maharashtra Agricultural Universities 8(3): 297-298. 5 ref.

In the twenty entries tested for their reaction to shootfly, the incidence of pest ranged from 19.99 to 64.78%. More no. of eggs were laid on susceptible entries. The mechanism of resistance is indicated by preference for oviposition on the more susceptible entries and non-preference on less susceptible entries.

0983 UNNITHAN, G.C. 1983. Effects of precocenes on the sorghum shootfly, Atherigona soccata (Diptera, Muscidae). Pages 357-368 In Natural products for innovative pest management (Whitehead, D.L., and Bowers, W.S., eds.). Oxford, UK: Pergamon Press.

Effects of antijuvenile hormone compounds, precocene I (P I) and precocene II (P II) on eggs, pupae and adults of the sorghum shootfly were investigated. Neither compound appeared to have a direct antigonadotropic action, however there was delay in egg maturation and high incidence of oocyte resorption after treatment of adult females with P II. Exposure of gravid females to P I and P II resulted in inhibition of embryogenesis and hatching of the eggs laid after treatment. Fumigation of eggs with P I inhibited hatching, but P II did not inhibit embryogenesis or hatching. Both P I and P II showed no discernible effects on pupae when applied topically. There was no indication of P I and P II having any definite antijuvenile

hormone activity on sorghum shootflies, however, both compounds showed very high toxicity and ovicidal effects.

0984 UNNITHAN, G.C., and MATHENGE, D.N. 1983. Influence of honeydew and artificial adult diets on longevity, fecundity and fertility of the sorghum shootfly, Atherigona soccata Rond. (Dipt., Muscidae). Zeitschrift fuer Angewandte Entomologie 95(1): 102-108. 34 ref.

Average fecundities of shootflies fed on baker's yeast and sugar, on sorghum aphid honeydew and on cowpea aphid honeydew were 202.3, 122.6 and 121.7 eggs, respectively; mean longevities on these 3 diets were 33.0, 22.8 and 16.2 days, respectively. Per cent eggs hatched was higher when the flies were fed on protein-rich diet and/or honeydew. The reproductive potential of the sorghum shootfly surpassed the previous reports.

Armyworms

0985 ALVAREZ R., J.A., and SANCHEZ G., G. 1983. Variation in the number of instars of Spodoptera frugiperda (J.E. Smith). (Es). Revista Colombiana de Entomologia 9(1-4): 43-49. 23 ref. (Summary:En).

In laboratory studies at El Espinal, Colombia on Spodoptera frugiperda, it was found that the number of larval instars varied with the diet and some undetermined genetic factor. Larvae of the 1st and 3rd generations had 6 instars when feeding on sorghum. Less than 25% of the 2nd generation had 7 instars feeding on 22-25 days old sorghum, but 100% had 7 instars when fed on 36-40 days old sorghum. When the sorghum was more than 50 days old, 11-50% of the larvae had 8 instars.

0986 CROCOMO, W.B. 1983. Consumption and utilization of corn, wheat and sorghum by Spodoptera frugiperda (J.E. Smith, 1797) (Lepidoptera, Noctuidae). (Pt). Ph.D. thesis, Escola Superior de Agricultura Luiz de Queiroz, Piracicaba, SP, Brazil. 110 pp. 69 ref. (Summary:En).

0987 CRUZ, I., SANTOS, J.P., WAQUIL, J.M., and BAHIA, F.G.T.F.C. 1983. Control of fall armyworm with granular insecticides mechanically applied to corn and sorghum crops. (Pt). Pesquisa Agropecuaria Brasileira 18(6): 575-581. 13 ref. (Summary:En).

A commercial granular insecticide applicator for soil application was used to apply granular insecticides directly into the plant whorl to control Spodoptera frugiperda. Methomyl, diazinon, forate, chlorpyriphos ethyl, fonofos, quinalphos, carbaryl and acetone were effective in controlling the insect.

0988 MORAY, P.E., KAZI, S.K., and BALLAL, A.S. 1983. Influence of weather factors on the outbreak of army worms. Journal of Maharashtra Agricultural Universities 8(2): 128-131. 4 ref.

The meteorological conditions predisposing an outbreak of Pseudalatia separata on sorghum, pearl millet and rice crops in Maharashtra, India during 1979 have been examined. Initial heavy precipitation followed by break monsoon conditions favoured the outbreak of the pest in an epidemic form.

0989 PITRE, H.N., MULROONEY, J.E., and HOGG, D.B. 1983. Fall armyworm (Lepidoptera: Noctuidae) oviposition: crop preferences and

egg distribution on plants. Journal of Economic Entomology 76(3): 463-466.

Of eight crop plant species evaluated for egg-laying preference by the fall armyworm, Spodoptera frugiperda, ryegrass, wheat, corn, and sorghum were the most preferred, whereas cotton and soybean were the least preferred. Older (54 to 64 days) and larger corn, cotton, sorghum, and soybean plants were strongly preferred for egg laying compared with the younger, smaller plants (22 to 42 days). Egg masses were concentrated on leaves between nodes 4 to 9 (x = 7.1) on corn, 3 to 9 (x - 6.1) on sorghum, 5 to 9 (x = 7.7) on cotton, and 4 to 9 (x = 6.3) on soybean. The under surface of the leaves of each of the four crop species above was preferred over the upper surface for egg deposition--100% for cotton and soybean, 92% for sorghum, and 70% for corn.

0990 SHARMA, H.C., and DAVIES, J.C. 1983. The oriental armyworm, Mythimna separata (wlk.) distribution, biology and control: a literature review. London, UK: Centre for Overseas Pest Research. 24 pp. 282 ref. (Miscellaneous Report no. 59).

The oriental armyworm, Mythimna separata is one of the serious cereal pests in the Asian and Australian continents. Serious outbreaks have occurred in India, China, Japan, Australia, New Zealand, Fiji, Bangladesh, and Thailand. Various theories are quoted to explain the outbreaks. Insect development varies according to temperature and humidity. Populations have been monitored using light traps, molasses-baited traps, and dry sorghum leaves. Larval behaviour varies considerably in the solitary and gregarious phases. In China and Japan migration is reported. Forty-two parasites, 16 predators, and 12 pathogens have been reported from the field. Male and female pheromones have been analysed. Differential varietal susceptibility occurs in wheat, rice, maize, and sorghum. A large number of chemicals give effective control.

Stem Borers

0991 ADESIYUN, A.A. 1983. Some effects of intercropping of sorghum, millet and maize on infestation by lepidopterous stalk-borers, particularly Busseola fusca. Insect Science and its Application 4(4): 387-391. 18 ref.

The highest number of B. fusca eggs were deposited on sorghum, followed by maize and least on millet, among the sole crops. The number of eggs found in the crop mixtures was intermediate between the numbers obtained when the crop components comprising the mixtures were considered as sole crops and averaged. The inability of B. fusca adults to effectively utilize millet for oviposition, reduced larval infestation of sorghum stems when interplanted with millet. The best combination was millet interplanted with sorghum in alternate stands within the same row.

0992 AMOAKO-ATTA, B., and OMOLO, E.O. 1983. Yield losses caused by the stem-/pod-borer complex within maize-cowpea-sorghum intercropping systems in Kenya. Insect Science and its Application 4(1-2): 39-46. 15 ref.

Tests for loss assessment were done under natural field conditions within maize, cowpea, sorghum monocropping patterns;

maize-cowpea, maize-sorghum, sorghum-cowpea dicropping patterns; and the maize-cowpea-sorghum tricrop intercropping patterns. Maize-cowpea-sorghum mixed intercrop of 1.45 land equivalent ratio (LER), and that for the sorghum-cowpea dicrop with 1.3 LER are considered the most advantageous cropping patterns. Yield losses significantly higher within maize-sorghum intercropping combinations with 0.89 LER further suggests that stem-borer colonisation which occurs at an earlier stage of crop establishment resulting in 'dead hearts' and significant reduction on plant population per unit area within the two cereal combinations contribute significantly to the overall reduction in crop turnover within such mixtures.

0993 AMOAKO-ATTA, B., OMOLO, E.O., and KIDEGA, E.K. 1983. Influence of maize, cowpea and sorghum intercropping systems on stem-/pod-borer infestations. Insect Science and its Application 4(1-2): 47-57. 29 ref.

An improved methodology of sampling for stem-/pod-borer pests within an intercropping farming system involving maize, cowpea and sorghum as target crops is described. The population of C. partellus, was significantly regulated within the intercropping systems. The borer incidence on the maize and sorghum monocrops and the maize/sorghum dicrop was earlier and accentuated with time, whereas intercropping of the cereals with non cereals caused significant delay in the borer colonisation and establishment within the intercropping systems. Incidence of 'dead hearts' caused by the borers was significantly higher within sorghum than maize stands. Sorghum shootfly was also regulated by intercropping. Pod damages resulting from Maruca attack were however influenced by the cropping patterns with mixed maize-cowpea-sorghum intercrop, producing significantly higher healthier pods. It is concluded that some intercropping patterns have advantages over monocropping patterns with respect to pest colonisation and establishment.

0994 ATKINS, R.E., GUTHRIE, W.D., ROSS, W.M., and KINDLER, S.D. 1983. Investigations of host-plant resistance to the European corn borer in sorghum. Iowa State Journal of Research 57(3): 275-292. 32 ref.

This paper reviews research on the effects of European corn borer (ECB), Ostrinia nubilalis, infestations on sorghum. It describes techniques of making artificial infestations and resistance ratings, and presents the consequences of infestations on grain yield and other agronomic traits. Reductions in yield and seed size from ECB infestations are assessed in several types of sorghum populations. Recurrent selection as a procedure for increasing the resistance of populations to ECB is examined.

0995 BERNAYS, E.A., CHAPMAN, R.F., and WOODHEAD, S. 1983. Behaviour of newly hatched larvae of Chilo partellus (Swinhoe) (Lepidoptera:Pyralidae) associated with their establishment in the host-plant, sorghum. Bulletin of Entomological Research 73(1): 75-83. 4 ref.

The climbing behaviour of newly hatched larvae of Chilo partellus on sorghum was studied in the laboratory and in the field in India. The upward movement was directed by light, while the final downward movement into the whorl was in response to the contrast of light above and dark below. Many larvae failed to reach the whorl.

Two sorghum cvs. IS 1151 and IS 2205, differed in the extent to which larvae successfully reached their whorls, and their relative susceptibilities altered with age.

0996 BOICA JUNIOR, A.L., and LARA, F.M. 1983. Evaluation of Sorghum bicolor (L.) Moench genotypes resistance to Diatraea saccharalis (Fabricius, 1974) (Lepidoptera-Pyralidae) and study of the mechanisms involved. (Pt). Anais da Sociedade Entomologica do Brasil 12(2): 261-272. 6 ref. (Summary:En).

Eight genotypes of sorghum were screened in Sao Paulo, Brazil for resistance to Diatraea saccharalis (F.), and the mechanisms of resistance were then studied. Infestation levels were higher in plots sown in October than in those sown in March. For all 3 resistant genotypes, there was a certain level of non-preference for feeding and/or antibiosis.

0997 BOICA JUNIOR, A.L., ZANINI, J.R., and MORAES, M.L.T. DE. 1983. Evaluation of grain and sweet sorghum genotypes with regard to infestation with Diatraea saccharalis (Fab., 1794) (Lepidoptera, Pyralidae). (Pt). Cientifica 11(1): 107-111. 4 ref. (Summary:En).

0998 CAICEDO ARANA, A., and OCAMPO DIAZ, R.L. 1983. Evaluation of damage caused by Diatraea spp. (Lepidoptera: Pyralidae) in maize and sorghum plantations in six municipalities located in the Departamento del Valle [Colombia]. (Es). Thesis, Universidad Nacional de Colombia, Palmira, Colombia. 87 pp. 38 ref. (Summary:En).

0999 CAMPION, D.G., and NESBITT, B.F. 1983. The utilisation of sex pheromones for the control of stem-borers. Insect Science and its Application 4(1-2): 191-197. 63 ref.

This paper reviews progress made in the identification of the sex pheromones of lepidopterous stem-borers and the use of these pheromones in the protection of sorghum and other crops. These uses include population monitoring with pheromone traps and control by mass trapping and mating disruption, and case histories for Ostrinia nubilalis and Chilo suppressalis are considered in detail to illustrate the problems encountered in applying these techniques. The pheromone blend, trap design, trap siting and pest biology are important factors in any monitoring system, and so far little progress has been made in correlating pheromone trap catches with subsequent larval infestations and crop damage by stem-borers. Control by mass trapping using pheromone traps has been little explored and is thought unlikely to provide a satisfactory control technique for many stem-borers. Control by mating disruption has also been examined.

1000 CHAPMAN, R.F., BERNAYS, E.A., WOODHEAD, S., PAIGHAM, D.E., and SIMPSON, S.J. 1983. Control of hatching time of eggs of Chilo partellus (Swinhoe) (Lepidoptera: Pyralidae). Bulletin of Entomological Research 73(4): 667-677. 6 ref.

In a sorghum field in India, most eggs of Chilo partellus hatched in the morning soon after first light. Laboratory experiments show that in continuous light, hatching occurs after 250 hour-degrees of development above 12 deg C from the time at which the head capsule darkens (blackheading). Hatching may be advanced by a lights-on stimulus or retarded by darkness, and these effects account for the extensive hatching at dawn. Hatching is not entrained by a

circadian rhythm. The significance of hatching at this time of day is discussed.

1001 CHAPMAN, R.F., WOODHEAD, S., and BERNAYS, E.A. 1983. Survival and dispersal of young larvae of Chilo partellus (Swinhoe) (Lepidoptera: Pyralidae) in two cultivars of sorghum. Bulletin of Entomological Research 73(1): 65-74. 2 ref.

The establishment and survival of Chilo partellus on two sorghum cvs. in the 6 days after hatching was investigated in a sorghum field in India. During this period relatively few larvae were present outside the whorls of the plants, and the numbers present 6 hrs, and 3 days after hatching were proportional to the nos. hatching. The no. of larvae in the plants declined during the first 3 days, but subsequently was stable. Some dispersal to adjacent plants occurred during this period and, at the plant spacing used, approximately 7 plants were infested by larvae from a single egg-mass of 40 eggs. The relative susceptibilities of the 2 cvs. IS 1151 and IS2205, altered with the age and size of plants. As the susceptibility of the plants changed with age it is important to decide the age at which protection would have the greatest economic value.

1002 CHESHIRE, J.M., JR. 1983. Influence of lesser cornstalk borer population density on damage to grain sorghum. Sorghum Newsletter 26: 79.

Three experiments were designed to measure damage thresholds for lesser cornstalk borer (LCB), Elasmopalpus lignosellus during 1982 at Georgia, USA. LCB populations ranged from 0 to 106,560 larvae/ha, populations of healthy plants from 9870 to 112,100 plants/ha, and grain yields from 245 to 4425 kg/ha. The differences between the 3 experiments suggest that LCB damage thresholds may be governed not only by LCB density, but also by factors influencing sorghum development and LCB behaviour.

1003 DABROWSKI, Z.T,, and KIDIAVAI, E.L. 1983. Resistance of some sorghum lines to the spotted stalk-borer Chilo partellus under western Kenya conditions. Insect Science and its Application 4(1-2): 119-126. 4 ref.

Field observations on Chilo infestation of 100 promising sorghum lines showed that there are 6 levels of relationship affecting plant colonziation and damage level by stem-borers; non-preference for oviposition; feeding of the first larval instars on young leaves; causing of 'dead hearts' by young larval instars due to extensive feeding in stems of young plants; tunnelling (extent and location) of older instars in stems; tolerance of plants to leaf damage; and tolerance of plants to larval feeding in stems. The effect of a number of cv. showing different levels and mechanisms of resistance on the Chilo behaviour and biology was studied in depth under field conditions.

1004 DALVI, C.S., DALAYA, V.P., and KHANVILKAR, V.G. 1983. Screening of some sorghum varieties for resistance to stemborer, Chilo partellus (Swinhoe). Indian Journal of Entomology 45(3): 266-274. 6 ref.

Thirty-two sorghum genotypes in kharif and 30 genotypes in rabi were screened in a randomised block design with two replications for their susceptibility to stem borer at Rahuri, India. Maximum damage was noticed in variety CSH-1 and minimum in the varieties E-303 and

E-302 in both the seasons. In single row experiment, the maximum and minimum leaf injury index was recorded in varieties SGIRL-ML-1 and Bilichigan, respectively.

1005 DHARMALINGAM, S. 1983. European corn borer resistance in sorghum compared with maize. Ph.D. thesis, Iowa State University, Ames, Iowa, USA. 63 pp.

Under heavy infestations of the first generation Ostrinia nubilalis, 211 genotypes of sorghum were evaluated for resistance. All sorghum hybrids were resistant. Mortality of first generation larva was rapid on 4 sorghum hybrids, but less rapid than on a resistant maize inbred. Resistance in sorghum and maize to first generation of the pest was resistance to leaf feeding and to second generation was to sheath-collar feeding.

1006 INAYATULLAH, C. 1983. Host selection by Apanteles flavipes (Cameron) (Hymenoptera: Braconidae): influence of host and host plant. Journal of Economic Entomology 76: 1086-1087. 4 ref.

The frass produced by 6 different lepidopterous borer species fed separately on surgarcane, corn, sorghum, pearl millet, and Sorghum sudanense was tested to determine the influence of host and host plant on the host selection behaviour of Apanteles flavipes adapted to corn borers in Pakistan. The frass produced by Chilo partellus, Sesamia inferens, and S. uniformis fed sorghum and corn was highly attractive.

1007 JOTWANI, M.G. 1983. Chemical control of cereal stem-borers. Insect Science and its Application 4(1-2): 185-189. 31 ref.

Chemical control of insect pests continue to be a major component of integrated pest management. However, control of tissue borers with insecticides is relatively more difficult than control of the insect pests feeding externally on foliage, shoots and stems of sorghum and other cereals. The foliar application of dust and spray formulation of most of the available insecticides has generally proved to be unsatisfactory as these cannot penetrate deep inside the tissues in sufficient quantities to kill the borers. Use of various pest management components as well as insecticide selectively based on improved application methods has now made the control of stem-borers more effective and economical. The development of new systemic insecticides and their granular formulation has further contributed towards the effective control of these borers. The research findings and recommendations for the control of cereal stem-borers are reviewed and discussed.

1008 KAUFMANN, T. 1983. Observations on the host plant adaptation of Busseola fusca (Lepidoptera: Noctuidae) in Nigeria. Proceedings of the Entomological Society of Washington 85(2): 321-326. 5 ref.

The sorghum diets in the northern and the southwestern populations of Busseola fusca in Nigeria produced high mortality, unbalanced sex ratio, and sterility. When the two populations were crossed, the hybrid adults did not mate with each other, although the gonads of both sexes were mature. These observations seem to indicate that adaptation to different diets is leading to genetic differences in this species.

1009 KHURANA, A.D., and VERMA, A.N. 1983. Some biochemical

plant characters in relation to susceptibility of sorghum to stemborer and shootfly. Indian Journal of Entomology 45(1): 29-37. 17 ref.

Biochemical constituents of 9 sorghum lines were estimated. Total sugars, tannin and total phenols in 30-day old plants, NDF, ADF, cellulose, lignin, tannin and total phenols in 50-day old plants were found to be negatively correlated with stem borer susceptibility. For phosphorus in 30-day old plants and total sugars and silica in 50-day old plants this relationship was positive Nitrogen and potassium did not show any such relationship. Susceptibility of sorghum to shootfly was found to be positively correlated with phosphorus and negatively with total phenols content.

1010 MLAMBO, S.S. 1983. The status of cereal stem-borer and legume pod-borer research in Zimbabwe. Insect Science and its Application 4(1-2): 221-222. 10 ref.

This paper highlights the current status of knowledge of the ecology and control of the maize stalk-borer, Busseola fusca (Fuller). Migration has been shown to be an important parameter in the proliferation of the pest. Control measures advocated to the farmers consists of a combination of stover disposal and the application of chemicals. Synthetic pheromones have a place in the integrated pest management of B. fusca in Zimbabwe. Since most of this information is based on work carried out in the commercial sector, future investigations will aim at defining the extent of B. fusca infestations and magnitude of losses in yields incurred in the communal areas.

1011 OGWARO, K. 1983. Intensity levels of stem-borers in maize and sorghum and the effect on yield under different intercropping patterns. Insect Science and its Application 4(1-2): 33-37. 13 ref.

At harvest taller plants of both sorghum and maize produced a greater grain yield, but under intercropping conditions maize always out-yielded sorghum when planted at the same time, whether the sorghum was planted in the same hill as maize, or in alternate hills, or in alternate rows. There were generally more stem-borers in sorghum than in maize, with Chilo partellus predominating. Intercropping increased the level of stem-borers in maize, while infestation was very low in pure stands of maize, and the level of borer infestation in sorghum remained the same. Implications of these results for predicting yield reduction due to stem-borers is discussed.

1012 PATHAK, R.S. 1983. Genetics of sorghum resistance to stem borers. Page 729 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Gene action in the inheritance of sorghum resistance to stem borers was studied in a dialleled series of F2 of selected crosses. Resistance was quantitatively inherited. Resistance to % deadheart was governed by both additive and nonadditive genes while % stem tunnelling was governed mainly by additive genes. There was partial dominance of resistance to susceptibility.

1013 PATHAK, R.S., and OLELA, J.C. 1983. Genetics of host plant resistance in food crops with special reference to sorghum stem-borers. Insect Science and its

Application 4(1-2): 127-134. 52 ref.

Genetic analysis of sorghum resistance to stem-borers was performed in a 6 x 6 diallel cross. The results indicated that resistance to stem-borers is polygenically inherited. F1 hybrids did not differ significantly from mid-parental values suggesting intermediate inheritance. However, resistance was partially dominant to susceptibility. Combining ability analysis showed that resistance to primary damage was governed by both additive and non-additive type of gene actions while secondary damage was governed predominantly by additive gene action. It was noted that the inheritance patterns of primary and secondary damage were different. Tunnel length showed positive correlation with the no. of larvae per plant and negative association with plant height, but had no correlation with grain yield per plant. Chilo partellus was found to be the predominant stem-borer, followed by Sesamia calamistis, Eldana saccharina, and Busseola fusca. Significance of genetic studies of host plant resistance in deciding breeding strategies for insect resistance is discussed.

1014 RAMAY, M.R. 1983. Management of maize stem borer, Chilo partellus (Swinhoe) infesting maize with sorghum as trap crop. Thesis, University of Agriculture, Faisalabad, Pakistan. 35 pp. 18 ref.

1015 RANA, B.S., SINGH, B.U., and RAO, N.G.P. 1983. Genetics of stem borer resistance in sorghum. Page 730 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Host plant resistance to Chilo partellus measured in terms of varietal reaction to leaf-feeding injury, % deadhearts, and tunnelling parameters showed quantitative variation. The heterosis over mid-parent for these characters was 72%, 12% and 19% respectively. The susceptibility was partially dominant over resistance. Additive genetic variance was considerably low.

1016 REDDY, K.V.S. 1983. Studies on the stem-borer complex of sorghum in Kenya. Insect Science and its Application 4(1-2): 3-10. 20 ref.

The distribution and importance of stem-borer species of sorghum in Kenya, viz. Chilo partellus, C. orichalcociliellus, Busseola fusca, Eldana saccharina and Sesamia calamistis were studied. The incidence and period of activity of the stem-borer complex on sorghum indicated that C. partellus, which is a major pest, infested the crop early, while E. saccharina and S. calamistis infested late and persisted in the crop till it was harvested. Preliminary studies on the carryover of stem-borer showed that the larvae of C. partellus and S. calamistis were able to enter diapause in dry sorghum stalks for several months at the end of long and short rainy seasons. Some new alternative host plants and parasites and predators affecting different life stages of stem-borers were identified. Preliminary screening of several sorghum lines was carried out for identification and confirmation of resistance to C. partellus and B. fusca, and some sources of resistance are reported.

1017 RIOS DE SALUSO, M.L.A., and CONDE, A.A. 1983. Determination of sampling unit size to evaluate damage in grain sorghum

by Diatraea saccharalis Fab. Sorghum Newsletter 26: 81.

For the sampling of plots not larger than a hectare, on-plant plots are more convenient, when the average of damaged internodes is higher than 0.1 but lower than 0.7. For larger plots, it is possible that the increase in the size of the sampling unit, while reducing the number of units to be selected, becomes necessary.

1018 SAGNIA, S.B. 1983. Possible integrated pest management tools for the effective control of cereal stem-borers in the Gambia. Insect Science and its Application 4(1-2): 217-219. 5 ref.

The current status of the cereal stem-borer problem on various crops in the Gambia is discussed. Various control strategies that can be properly selected and integrated are identified. These strategies offer promise for an effective and more economical control of stem-borer infestations and their implementation, it is envisaged, would go a long way in reducing losses due to these pests. The constraints in implementing of these strategies are discussed and ways of solving them suggested.

1019 SARUP, P., SIDDIQUI, K.H., and MARWAHA, K.K. 1983. Compounding artificial diets for mass rearing of the maize stalk borer, Chilo partellus (Swinhoe). Journal of Entomological Research 7(1): 68-74. 23 ref.

The choice of artificial diets: (i) minimum number of cheap, indigenous and easily available ingredients, (ii) easy and simple preparation technique, (iii) low cost of insect production, and (iv) differential response of C. partellus reared on different artificial diets and host-plants (maize/sorghum). The use of legumes made feasible the mass production of C. partellus.

1020 SINGH, B.U., RANA, B.S., REDDY, B.B., and RAO, N.G.P. 1983. Host plant resistance to stalk-borer, Chilo partellus Swin., in sorghum. Insect Science and its Application 4(4): 407-413. 7 ref.

Seventy cultivars of sorghum were tested for stalk-borer resistance under artificial infestation during monsoon season. There were significant differences among varieties for leaf-feeding injury, per cent 'dead hearts', number of holes and tunnels and per cent tunnelling. Released hybrids and local varieties were susceptible for different parameters. 13 varieties were at par with resistant varieties for per cent tunnelling per plant. Long peduncle varieties were relatively susceptible. Leaf-feeding injury, per cent 'dead hearts' and tunnelling parameters were not significantly correlated and independent of each and none of them could be related to grain yield. Number of holes, number of tunnels and per cent tunnelling were positively correlated. Number of holes per plant or internode was found to be a good indicator of per cent tunnelling and could be used as a criterion for evaluating germplasm to stalk-borer resistance. The varieties CSV-8R, SPV-5, SPV-103, SPV-140 and SPV-192 were identified as promising sources of resistance to stalk borer.

1021 TEMERAK, S.A. 1983. A preliminary survey on the soil-inhabiting predacious arthropods associated with pupae of the large sugarcane borer, Sesamia cretica Led., in sorghum field. Bulletin de la Societe Entomologique d'Egypte 62: 251-255. 4 ref.

In a survey conducted in Egypt, 16 species of predators were found. The ant, Paratrechina sp accounted for most of the natural mortality of Sesamia pupae.

1022 TEMERAK, S.A. 1983. Studies on certain factors affecting the envenomation by the parasitoid, Bracon brevicornis Wesmael. 1. Ratios of females to host larva, ratios of host larvae to a female and size of host insect. Zeitschrift fuer Angewandte Entomologie 96(4): 364-368. 10 ref.

Laboratory studies were undertaken to investigate certain factors affecting the envenomation by the parasitoid, Bracon brevicornis. These factors are venom doses, ratios of host larvae exposed to single female, and size of host larvae. No permanent paralyzed larvae Sesamia cretica were observed before 0.5 hour of exposure to the parasitoid. This was true, even when one host larva was exposed to 8 adult females. Increasing numbers of females kept with one host larva resulted in increased numbers of immobolized larvae specially during the first 3-4 hours. The latter was reliable even with 6 females/larva, thereafter differences were not significant. The number of completely paralyzed larvae increased with an increase in number of host larvae exposed to a single female specially after 2 days. Within the same species large host larvae were significantly less sensitive to the parasitoid's venom than small larvae, during 6 hours, respectively.

1023 VERMA, K.K., and JOTWANI, M.G. 1983. Life processes of the sorghum stemborer Chilo partellus Swinhoe of different agroclimatic areas. Indian Journal of Entomology 45(4): 477-478. 1 ref.

The biology and behaviour of samples of Chilo partellus collected from Delhi, Indore, Nagpur and Hyderabad, India, were compared in laboratory studies. Insects of the Delhi population laid more eggs and completed their life cycle more quickly than those of the other populations. The maximum number of diapausing larvae was observed in Delhi sample.

1024 WOODHEAD, S., BERNAYS, E.A., and CHAPMAN, R.F. 1983. Screening strategies for resistance of sorghum to Chilo partellus. Page 840 In Proceedings of the Tenth International Congress of Plant Protection, 20-25 November 1983, Brighton, UK. v. 2. Croydon, UK: British Crop Protection Council. 2 ref.

Observations were made using newly hatched larvae by placing an individual on the test plant in the field at the level of the lowest leaf. Many larvae failed to reach the whorl, more being successful on young plants of the cv. IS1151 than on IS2205, and climbing was faster on IS1151. The effect was reversed on older plants with more larvae reaching the whorl on IS2205. Initial establishment was found to be important in determining overall survival, and establishment was determined by the relative success of the larvae in reaching the whorl. The implications for screening sorghum for resistance to Chilo partellus is discussed.

1025 YIN, Y.S., MENG, S.J., and CHANG, J.Y. 1983. Occurrence of the corn-borer in sorghum fields and the biological characteristics of their main natural enemies. (Ch). Shanxi Agricultural Science 12: 18-19.

Ostrinia nubilalis was found to have 2 generations a year in

studies on sorghum in China during 1980-82. Its natural enemies are listed and their development in host larvae are studied.

Spider Mites

1026 BORAD, P.K., MITTAL, V.P., and DESAI, K.B. 1983. Efficacy of some insecticides in control of sorghum mite under field conditions. Sorghum Newsletter 26: 72.

The effects of 9 treatments composed of 3 systemic insecticides on the control of Oligonychus indicus on sorghum was studied. There was no significant difference between methyl-o-demeton applied 40 and 50 days after germination and other treatments. Dimethoate, Formothion, and Phenthoate treatments were superior to methyl-o-demeton applied 50 days after germination, which was about equal to Wet-Sulf, but superior to the control and water.

1027 MITTAL, V.P., DESAI, K.B., KADAM, J.R., and BORAD, P.K. 1983. Efficacy of water and urea 2% spray in controlling sorghum mites on grain sorghum. Sorghum Newsleter 26: 72.

The mite damage ratings indicated that the application of 2% urea spray at 2000 lit/ha resulted in the highest yield and the lowest mite damage rating.

1028 MOTE, U.N. 1983. Unusual epidemics of mite on sorghum in Maharashtra. Acarology Newsletter 13: 3.

Infestations, yield losses, and the reasons for the outbreak of Oligonychus in Maharashtra, India in 1982 are discussed.

1029 PERRING, T.M., ARCHER, T.L., KRIEG, D.L., and JOHNSON, J.W. 1983. Relationships between the Banks grass mite (Acariformes: Tetranychidae) and physiological changes of maturing grain sorghum. Environmental Entomology 12(4): 1094-1098. 21 ref.

Cytoplasmic male-sterile and male-sterile producing sorghum lines were used to create different levels of leaf nitrogen, phosphorus, and carbohydrates by manipulating seed set. Higher nitrogen and carbohydrate concentrations were present in sterile plants, whereas phosphorus levels were influenced more by sorghum variety. Only soluble sugar concentration was significantly related to mite densities throughout the grain filling period, with carbohydrates having a negative influence on the mites. Spider mite response to nitrogen and phosphorous concentrations were dependent upon plant phenology.

Sorghum Midge

1030 BALETKA, A.D., and CASTELLANO, S.R. 1983. Percentage of damage in lines and cultivars of sorghum with different levels of resistance to the gall midge, Contarinia sorghicola. (Es). Divulgacion Tecnica, INTA 10: 1-5.

1031 BALETKA, A.D., and CASTELLANO, S.R. 1983. Screening for sorghum midge resistance. Sorghum Newsletter 26: 70.

Sixteen sorghum entries were evaluated for midge resistance during 1981-82 at Manfredi Experiment Station, Argentina. Percentage damage was determined by the ratio between grain no. produced by protected and

unprotected sorghum heads due to natural infestation of sorghum midge.

1032 BAXENDALE, F.P. 1983. Modeling seasonal development of the sorghum midge, Contarinia sorghicola (Coquillett). Ph.D. thesis, Texas A & M University, College Station, Texas, USA. 105 pp.

Emergence from overwintering and development of nondiapausing populations of the sorghum midge were described by 2 separate temperature-dependent models. The poikilotherm rate equation and cumulative Weibull distribution provided accurate emergence data. Model simulations compared favorably with adult emergence from johnsongrass and sorghum throughout the season.

1033 BAXENDALE, F.P., and TEETES, G.L. 1983. Factors influencing adult emergence from diapausing sorghum midge, Contarinia sorghicola (Diptera: Cecidomyiidae). Environmental Entomology 12(4): 1064-1067. 4 ref.

Sorghum midge diapause was terminated in the laboratory, and factors affecting adult emergence from diapausing larvae were investigated. Temperatures in the range from 20 to 30 deg C were optimum for diapause termination and adult emergence. Diapausing larvae exposed to moist conditions at 30 deg C began to emerge as adults after 12 days of incubation. Based on adult emergence rates per day, an emergence threshold temperature was estimated to be 14.8 deg C. Exposure to 12 to 13 days of continuous moisture at 30 deg C was essential for diapause termination and adult emergence. Moisture acted to initiate diapause termination, but diapausing larvae were unable to accumulate shorter periods of moisture toward the 12- to 13-day requirement. Photoperiod had no significant effect on the termination of larval diapause.

1034 BAXENDALE, F.P., and TEETES, G.L. 1983. Seasonal development models for the sorghum midge (Contarinia sorghicola Coquillet) Sorghum Newsletter 26: 80.

The coupling of spring emergence and nondiapause generation models was found suitable for incorporating into a larger seasonal dynamics model for the sorghum midge. With the addition of fecundity and mortality data to predict changes in population density, the model is expected to provide excellent forecasts of economic sorghum midge densities throughout the temperature range of the pest.

1035 BAXENDALE, F.P., and TEETES, G.L. 1983. Thermal requirements for emergence of overwintered sorghum midge (Diptera: Cecidomyiidae). Environmental Entomology 12(4): 1078-1082. 11 ref.

Emergence of overwintered sorghum midges was monitored during 1979, 1980, and 1981. Differences in emergence times and distributions among years was a function of soil temperature and rainfall. Adult midges initiated emergence after accumulating 431 centigrade heat units above a threshold temperature of 14.8 deg C, whereas, 679 and 977 heat units were required for 50 and 95% emergence, respectively. Sorghum midges overwintered in johnsongrass spikelets and in sorghum spikelets. The time that midges initiated diapause one year had little effect on the timing or distribution of emergence the following spring. No midges terminated diapause and emerged as adults during the same season that diapause was initiated. Of the

diapausing midges, 23% failed to emerge until the second spring and 2.6% emerged the third spring, but times and distributions of emergence were similar for all years.

1036 BAXENDALE, F.P., LIPPINCOTT, C.L., and TEETES, G.L. 1983. Biology and seasonal abundance of hymenopterous parasitoids of sorghum midge (Diptera: Cecidomyiidae). Environmental Entomology 12(3): 871-877. 16 ref.

Four hymenopterous parasitoids of sorghum midge, Contarinia sorghicola (Coquillett), were found in Texas: Eupelmus popa Girault, Tetrastichus near venustus Gahan, Tetrastichus near blastophagi (Ashmead), and Aprostocetus diplosidis Crawford. E. popa and A. diplosidis were ectoparasitic on the midge host in sorghum spikelets, while T. near venustus fed both externally and internally. Members of the parasitoid complex oviposited and developed to adults in spikelets containing 1- to 18-day-old immature midges, which corresponded to larval and pupal stages of midges. Most parasitoids developed from midges parasitized as mid-stage larvae. Developmental time from egg to adult emergence ranged from 7 to 32 days for the parasitoid complex. Emergence of most adults of the individual parasitoid species ranged from 15 to 19 days. This developmental time corresponded to that of the midge host, which emerged as adults in 15 to 18 days after oviposition. E. popa was most abundant during spring and early summer in both johnsongrass and sorghum.

1037 DOUMBIA, Y.O. 1983. Host plants of sorghum and millet midges at the Sotuba Agricultural Research Station [Mali]. (Fr). Pages 23-29 In Commission Technique des Productions Vivrieres et Oleagineuses. Cellule Defense des Cultures Projet lutte integree Mali. Resultats campagnes 1982-1983, Entomologie (Doumbia, Y.O., Sidibe, B., Toure, K., and Bonzi, M.S.). Bamako, Mali: Institut d'Economie Rurale. (Document no. 6).

1038 HAGIO, T., HOSHINO, T., ONO, S., and UMEHARA, M. 1983. Evaluation of sorghum midge, Contarinia sorghicola resistance. Sorghum Newsletter 26: 71.

Eighteen varieties were evaluated for midge resistance in Japan. The rate of damaged grains increased in the later plantings. The mean percentage damaged grains for the varieties are given.

1039 KUKADIA, M.U., DESAI, K.B., PATEL, R.H., and DESAI, M.S. 1983. Heterosis and combining ability for midge resistance in sorghum. Page 5 In Precongress Scientific Meeting on Genetics and Improvement of Heterotic Systems. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

Forty two crosses exhibited heterosis over the midparental value for midge resistance in a study of line x tester crosses involving 5 females and 22 males. 2 females and 6 males were promising combiners and 4 crosses were good specific combinations for resistance.

1040 LIPPINCOTT, C.L., and TEETES, G.L. 1983. Biology and nature of parasitism of hymenopterous parasitoids of sorghum midge. Progress Report, Texas Agricultural Experiment Station 4146: 1-6. 16 ref.

Eupelmus popa and Aprostocetus diplosidis were ectoparasitic on the midge host in sorghum

spikelets, while Tetrastichus near venustus fed both externally and internally. Mode of feeding by T. near blastophagi was not determined. Most parasitoids developed from midges parasitized as mid-stage larvae. Developmental time from egg to adult emergence ranged from 7 to 32 days for the parasitoid complex. Emergence of most adults of the individual parasitoid species ranged from 15 to 19 days. This developmental time corresponded to that of the midge host, which emerged as adults in 15-18 days after oviposition.

1041 ROSSETTO, C.J., and IGUE, T. 1983. Inheritance of resistance to Contarinia sorghicola Coquillet in the AF-28 sorghum variety. (Pt). Bragantia 42(19): 211-219. 4 ref. (Summary:En).

Reciprocal crosses were made between the sorghum varieties AF-28 resistant to the sorghum midge, and Sart susceptible. In 1975 under field conditions at Campinas, Brazil the average damage of the F1 of these crosses was 8.5, the average damage of Sart was 9.2 and of AF-28 was 1.2 showing that susceptibility to sorghum midge is dominant. Inflorescences of F2 plants were bagged at random and F2 derived families in the generation F3 (S1 lines) were studied under field conditions in 1977. A minimum of two genes governed the resistance to sorghum midge in AF-28. Some lines derived from F3 families with low mean damage showed good agronomic characteristics together with good level of resistance showing that the resistance can be transferred and recombined to produce resistant cv. or hybrids.

1042 SHARMA, H.C., LEUSCHNER, K., and VIDYASAGAR, P. 1983. Factors influencing host finding and oviposition by the sorghum midge, Contarinia sorghicola. Presented at the International Conference on Regulation of Insect Reproduction by Natural Products, 29 September - 1 October 1983, Regional Research Laboratory, Jammu, India. Patancheru, Andhra Pradesh, India: ICRISAT. 15 pp. 17 ref. (Limited distribution).

Sorghum midge behaviour was influenced by colours. Yellow, red and white colours were attractive to the midge. The midge flies were guided to the host by colour and by earhead odours. The chemical and physical stimuli from the anthers and stigma influenced oviposition process. Lower oviposition or lower larval survival leading to reduced adult emergence were found to be useful resistance mechanisms against midge.

1043 TANGARA, Y. 1983. Contribution to the study of Cecidomyidae (Contarinia sorghicola) of sorghum at the [agronomic research] station of Sotuba [Mali]. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 27 pp.

1044 THONTADARYA, T.S., RAO, K.J., and RANGADHAMAIAH, K. 1983. Biology of Tetrastichus diplosidis (Crawford) (HYM: Eulophidae), a larval ecto-parasite of the sorghum earhead midge, Contarinia sorghicola (Coquillet) (Dipt.:Cecidomyiidae). Mysore Journal of Agricultural Sciences 17(1): 36-40. 12 ref.

The studies revealed that the oviposition of Tetrastichus diplosidis occurred in spikelets close to Contarinia sorghicola larvae. The egg stage lasted for 24.8 h, the larval stage for 10.16 days, and the pupal stage for 6.55 days for males and 6.80 days for females. Adult life span of males was 7.25 and females 6.50 days on honey diet and 3.55 and 3.27 days

without food. Fecundity averaged 46.40 eggs with food and 5.83 eggs without food.

Head Caterpillars

1045 AUSTRALIA:QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES. 1983. Annual report 1982-83. Queensland, Australia: Department of Primary Industries. pp. 28-29.

The entomology section of this report provides a brief review of the highlights of research. Sprays with pyrethroids on sorghum in the Central Highlands was found effective in controlling Heliothis armigera.

1046 NARESH, J.S., and SMITH, C.M. 1983. Development and survival of rice stink bugs (Hemiptera: Pentatomidae) reared on different host plants at four temperatures. Environmental Entomology 12(5): 1496-1499. 6 ref.

The suitability of rice, sorghum, and vasey grass, as host plants of the rice stink bug, Oebalus pugnax were determined at 21, 24, 27, and 30 deg C. At 21, 24, and 27 deg C there were no significant differences in the weight of 10-day-old nymphs reared on the 3 hosts, but at 30 deg C, weights of nymphs reared on sorghum were significantly greater. The mean development time from egg to adult on rice, sorghum, and vasey grass at 30 deg C was 22.9 days, 20.7 days, and 22.3 days, respectively.

1047 PATEL, Z.P., and MITTAL, V.P. 1983. Life-table studies of (Heliothis armigera Hub.) on sorghum. Sorghum Newsletter 26: 76.

Under conditions of limited space and sufficient food supply, the density of Heliothis armigera on sorghum panicles had an innate capacity for increase in numbers of 0.1795 and a finite rate of increase of 1.63/female/day. The net reproductive rate was 191.18. A generation was completed in 29.19 days. It was estimated that on reaching stable age-distribution, the population would be comprised of 48.7% eggs, 43.2% larvae, 7.4% pupae and 0.6% adults.

1048 SINGH, S.P., and LODHI, G.P. 1983. Record of sorghum earhead worm Cryptoblabes gnidiella Milliere (Lepidoptera: Pyralidae) from Haryana. Agricultural Science Digest 3(2): 99-100. 6 ref.

Cryptoblabes gnidiella Milliere was recorded for the first time from Haryana, India on sorghum crop. The larvae fed on the grain and formed web out of the excreta and silken threads on the cobs. The no. of caterpillars per earhead of sorghum varied from 3 to 11 and the larval period from 12 to 20 days. Pupation took place inside the silken webs. The pupal period was about 6 to 15 days under laboratory conditions.

1049 TEAKLE, R.E., PAGE, F.D., SABINE, B.N.E., and GILES, J.E. 1983. Evaluation of Heliothis nuclear polyhedrosis virus for control of Heliothis armigera on sorghum in Queensland, Australia. General and Applied Entomology 15: 11-18. 15 ref.

Elcar, a commercial preparation of a nuclear polyhedrosis virus of Heliothis was tested on sorghum. Aerial application or ground spraying caused high levels of viral infection.

1050 TWINE, P.H., KAY, I.R., and LLOYD, R.J. 1983. Heliothis in sorghum. Queensland Agricultural Journal 109(4): 185-188.

Information on the incidence, biology, identification and economics of chemical control of Heliothis armigera on sorghum is given.

1051 WISEMAN, B.R. 1983. Corn earworm feeding responses on sorghum grain in diet mixtures. Sorghum Newsletter 26: 78.

The corn earworm (CEW) larvae fed the funks 5245 at 50 g were significantly smaller after both 7 days and 11 days feeding than larvae fed the other diet treatments. The larvae that were fed the funks 5245 at 25 g and PI383856 at 50 g were intermediate in size as indicated by the effect of the diet mixture on CEW feeding responses and resultant larval growth.

1052 YEARIAN, W.C., and LORENZ, G.M. 1983. Efficacy of Elcar against Heliothis species. Arkansas Farm Research 32(4): 5.

Elcar, nuclear polyhedrosis virus was evaluated on sorghum fields infested with Heliothis spp. in Arkansas, USA. Elcar at higher dosage rates provided adequate protection of sorghum for Heliothis zea.

Stored Grain Pests

1053 ALI, K.A., and BALASUBRAMANIAN, M. 1983. A search for relative resistance of sorghum accessions to the rice weevil (Sitophilus oryzae L.) (Curculionidae: Coleoptera). Page 25 In Proceedings of the National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Coimbatore, Tamil Nadu, India. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

Six hundred and sixty accessions were screened by no choice and free choice tests. IS7173 (R1) and IS3443 (R2) were resistant and IS3606 (MR1) and IS3569 (MR2) were moderately resistant.

1054 ALI, K.A., and BALASUBRAMANIAN, M. 1983. Investigations on the mechanism of resistance in sorghum to the rice weevil Sitophilus oryzae (L.) (Curculionidae: Coleoptera). Page 54 In Proceedings of the National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Coimbatore, Tamil Nadu, India. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

Studies on 660 accessions revealed that grain hardness was associated with weevil resistance. Resistant accessions contained less protein and amino acids but more starch and tannin than susceptible ones.

1055 BENGSTON, M., COOPER, L.M., DAVIES, R.A.H., DESMARCHELIER, J.M., HART, R.H., and PHILLIPS, M.P. 1983. Grain protectants for the control of malathion-resistant insects in stored sorghum. Pesticide Science 14(4): 385-398. 14 ref.

Duplicate experiments were carried out on bulk sorghum stored in Queensland. Bioassays of treated grain, conducted during 6 months' storage, established that fenitrothion at 12 mg/kg + bioresmethrin at 1 mg/kg and pirimiphos-methyl at 4 mg/kg + carbaryl at 8 mg/kg controlled typical-malathion resistant strains of Sitophilus oryzae, Rhyzopertha dominica, Tribolium castaneum and Ephestia cautella. Chlorpyrifos-methyl at 10 m g/kg +

pyrethrins at 1.5 mg/kg + piperonyl butoxide at 12 mg/kg and fe nitrothion at 12 mg/kg + (1R) phenothrin at 1 mg/kg also controlled all the tested species except E. cautella. Chemical assays established that the residues and rates of breakdown of these grain protectants on sorghum conformed to the general pattern for other cereal grains; residues from the above treatments were below the individual maximum residue limits recommended by the Codex Alimentarius Commission.

1056 BORAD, P.K., MITTAL, V.P., and DESAI, K.B. 1983. Grain losses in stored sorghum due to rice moth. Sorghum Newsletter 26: 72.

Apparent and real weight loss due to Corcyra cephalonica in 14 cv. of sorghum were determined in a laboratory trial. Maximum apparent loss was recorded in CSV-6 (4.29%) and real loss in CSV-6 (10.57%).

1057 BULBUL, O., ARTZI, A., MESHAL, M., FRANDJI, H., and GOLANI, Y. 1983. Survey of the condition of grain stocks in government storage. (He). Pages 109-115 In Progress report for the year 1981/82 of the Stored Products Division. Bet Dagan, Israel: Institute for Technology and Storage of Agricultural Products. 1 ref. (Summary:En).

Samples of grains including sorghum from 75 ships and 49 silos and warehouses in Israel were inspected in 1981-82. About 19.5% of the samples were infested by insects (including Sitophilus oryzae (L.), Tribolium spp., Rhyzopertha dominica (F.), Oryzaephilus surinamensis (L.) and Ephestia cautella (Wlk). About half of the infestations were at the bases of bins. An increase in preventive treatment of empty bins before loading appeared to have been responsible for the reduction in the proportion of infested samples as compared with earlier years.

1058 FLEURAT-LESSARD, F. 1983. Feasibility and results of population dynamics studies on stored grains insects in small scale bins with simulated climatic conditions. Pages 23-24 In Proceedings of the Third International Working Conference on Stored-Product Entomology, 23-28 October 1983, Manhattan, Kansas, USA. Bordeaux, France: Institut National de la Recherche Agronomique, Centre de Recherches de Bordeaux.

Population dynamics of Sitophilus granarius, Sitophilus oryzae, Rhyzopertha dominica on sorghum and wheat are studied.

1059 TELI, V.S., PAWAR, M.B., and KALBHOR, S.E. 1983. Studies on the varietal susceptibility of some sorghum varieties and hybrids to Sitophilus oryzae Linn. Science and Culture 49(7): 218-219. 3 ref.

There was considerable difference in susceptibility to the weevil in the 20 varieties tested. Seed weight did not have any relation to resistance. A significant negative association of seed hardness with the relative incidence of weevils was noticed. There was more grain moisture percentage in susceptible varieties than in less susceptible varieties.

Birds, Rodents, and Other Pests

1060 ASBORNO, M.D., and CHIDICHIMO, H.O. 1983. Grain sorghum evaluation of resistance to damage by birds. (Es). Revista de la Facultad de Agronomia,

Universidad Nacional de la Plata 57-58(1-2): 9-22. 18 ref. (Summary:En).

1061 BILLIET, F. 1983. Effect of the granivorous birds on the cereal crops in the Central Niger delta, Mali. (Fr). Tropicultura 1(4): 133-135. 7 ref. (Summary:En).

1062 KADAM, J.R., and MOTE, U.N. 1983. Landrin as a bird retardant in grain sorghum. Sorghum Newsletter 26: 29.

The bird attack in plot treated with Landrin was reduced to a great extent and the yield increase in the treated plot was 33.30% over the untreated one.

1063 POLOP, J.J., SABATTINI, M.S., and GARDENAL, C.N. 1983. Rodent communities in sorghum fields of the Cordoba province, Argentina and their possible relation with argentine hemorrhagic fever. (Es). Ecosur 9(18): 107-116.

1064 RENAPURKAR, D.M., and DEORAS, P.J. 1983. Food habits of the lesser bandicoot rat Bandicota bengalensis. Bulletin of Haffkine Institute 11(1): 11-13.

1065 SANTHAIAH, N., SHIVANARAYAN, N., and SINGH, T.G.M. 1983. Bird pests of sorghum and losses associated with their damage. Indian Journal of Plant Protection 11(1-2): 115-117. 3 ref.

Assessment of bird damage to sorghum earheads was conducted in 60 fields in Andhra Pradesh, India having the crop in grain maturing stage. None of the varieties tested was fully safe from bird damage. The extent of bird damage was less in awned varieties as the pests showed preference to awnless varieties.

1066 SARWAR, H.A.K. 1983. Protection to sprouting sorghum against bird pest "Blue rock pigeon" Columba livia (Gmelin) by combined avoidance strategy. Sorghum Newsletter 26: 9.

Placement of 200 g per hectare of sorghum seeds treated with carbofuran @ 100 g/kg of seed, placed on pieces of paper each containing 15-20 g of treated seeds well distributed covering the corners and centers of the entire field acting as a "Bird repellent" deep sowing to avoid easy reach of birds beak, and scaring birds by making vocal sounds and beating empty drums with sticks for a period of 15 days immediately after sowing provided significant protection to sprouting sorghum from bird damage.

1067 SHARMA, R.K., and SAXENA, Y. 1983. Food consumption and food preference (sorghum) in Indian desert gerbil, Meriones hurrianae. Pakistan Journal of Zoology 15(2): 221-223.

Plant Protection and Seed Treatment

1068 SELVARAJ, J.C. 1983. Possible use of systemic fungicides in cereals seed treatment. NOMA 4(1): 26-27.

Seed dressing formulations containing systemic fungicides such as benomyl, carbendazim and thiophanate methyl may be used to treat sorghum and millet seeds, particularly in areas where seedling establishment failures occur frequently. Combination of systemic and non-systemic fungicides may be used to guarantee wider protection of seeds and young seedlings.

1069 SOLANKE, R.B., and KULKARNI, L.P. 1983. Effects of

fungicide and insecticide combinations on seed germination and seed mycoflora in stored sorghum seed. Sorghum Newsletter 26: 115.

The seed treatment with Thiram + D.D.T., Thiram + B.H.C., and Thiram + Carbaryl gave highest germination percentages throughout the storage period when compared to the other combinations. Zineb-75 + B.H.C., Monosan + B.H.C., and Monosan + Carbaryl is recommended of sorghum seed (slurry) to inhibit growth of seed mycoflora and to maintain germinability at 80% throughout the period from July to February.

CHEMICAL COMPOSITION

1070 AJAKAIYE, C.O. 1983. Amino acid composition of sorghum grains as influenced by grain maturity, genotype, and nitrogen fertilization. Journal of Agricultural and Food Chemistry 32(1): 47-50. 14 ref.

Field experiments were conducted in 1977 and 1978 using 3 sorghum genotypes, and 4 nitrogen rates in Nigeria. N application increased total amino acids, g/17g of N, but consistently decreased total essential amino acids of grains. Essential amino acid concentration significantly increased with grain maturity in both years. Genotype influenced grain amino acid composition. Inverse relationships were evident between grain protein and lysine and methionine and between the latter two and leaf nitrate reductase activity.

1071 ASQUITH, T.N., IZUNO, C.C., and BUTLER, L.G. 1983. Characterization of the condensed tannin (proanthocyanidin) from a group II sorghum. Journal of Agricultural and Food Chemistry 31(6): 1299-1303. 34 ref.

Tannin from a group II sorghum (IS 8768) was purified and compared with that of a group III sorghum (DeKalb BR 64). No significant differences in the properties of purified tannins were noticed. Tannin extractable only in acidic methanol was present along with methanol-extractable tannin in most of the group III sorghums, especially in immature grain. The differentially extractable tannins did not appear to have a precursor/product relationship.

1072 BABADOOST, M., TYCZKOWSKA, K., HAGLER, W.M., JR., BOWMAN, D.S., and HUFF, W.E. 1983. Zearalenone in sorghum fractionated by density segregation. Phytopathology 73(5): 823-824. (Abstract).

Nine samples of sorghum were segregated into a fraction buoyant in water, a fraction buoyant in brine, and a fraction nonbuoyant in either liquid and analyzed for zearalenone. Buoyant fractions in water, brine and nonbuoyant in brine were found to contain 87, 13, and 0% of zearalenone respectively.

1073 BOYER, C.D., and LIU, K.C. 1983. Starch and water-soluble polysaccharides from sugary endosperm of sorghum. Phytochemistry 2(11): 2513-2515. 20 ref.

The starch and water-soluble polysaccharides from sugary (su) endosperm of sorghum were isolated and characterized. Starch granule structure and composition were similar to sugary maize starch. The water-soluble polysaccharide was compared to rabbit liver glycogen and su maize phytoglycogen. Based on iodine spectra, conversion to maltose by B-amylase, average chain length, size distribution of chains after isoamylase

debranching and resistance to pullulanase debranching, su sorghum water-soluble polysaccharide was concluded to be phytoglycogen. Particulate and soluble fractions of su sorghum phytoglycogen were prepared by centrifugation at 14000 g. These fractions were similar to fractions of su maize phytoglycogen prepared by the same method. These results support the hypothesis that su maize and su sorghum are homologous mutants.

1074 CORDEIRO, D.S., KICHEL, A.N., PAULETTO, A.E., ASSIS, V.G. DE, and SILVEIRA JUNIOR, P. 1983. Dry matter weight of several summer crops (sorghum) used as green manure in the slope of southeastern Rio Grande do Sul. (Pt). Pages 149-155 In Soybean research findings, 1980-81. Pelotas, RS, Brazil: Unidade de Execucao de Pesquisa de Ambito Estadual de Pelotas. 7 ref.

1075 DOHERTY, C.A., BROUSSARD, J., and FAUBION, J.M. 1983. Phenolic compounds associated with cell wall material of Sorghum bicolor. Cereal Foods World 28(9): 559. (Abstract).

Cell wall material (CWM) was isolated from 6 sorghum varieties differing in genetic traits for pericarp color and presence or absence of a pigmented testa. CWM phenolic acids were analysed by reverse phase HPLC. Five major peaks were present in the CWM of all cultivars analyzed. Ferulic acid was the major phenolic acid present at levels of 2000-6000 micro g/g CWM. P-coumaric acid was identified at concentrations of 600-1050 micro g/g CWM. A 6th unidentified peak eluting early in the chromatogram was found in CWM of sorghums with a pigmented testa layer. This compound was not present in CWM of sorghums lacking a pigmented testa.

1076 EL-KHOLANY, A.A., HASSAN, A.A., and RAMAOAN, A.H. 1983. Protein, tryptophane, lysine, flour extraction and grain yield of sorghum as influenced by genotype. Journal of Agricultural Sciences, Mansoura (Egypt) 8(1): 23-28. 8 ref.

1077 EUCLYDES, M.P., JUNQUEIRA, R.G., KALAGI KIBUUKA, G., and MAFFIA, L.M. 1983. Characterization of sorghum (Sorghum bicolor) flours processed in maize and wheat mills. 1. Centesimal composition. Revista Ceres 30(169): 189-198. 26 ref.

1078 FAYEK, H.M., HAMZA, A.S., MADY, Y.A., and HEGAZY, S.A. 1983. Protein content and amino acids pattern of some sorghum varieties as compared to high lysine Opaque-2 corn. Annals of Agricultural Science, Moshtohor 20(1): 211-222. 21 ref. (Summary:Ar).

Eight sorghum cultivars and Opaque-2 maize were investigated for amino acid composition and protein solubility. One sorghum cv. Giza 114 had high lysine, tryptophan and methionine contents, and showed high total soluble protein and glutelin contents. There was little difference in the isoleucine: leucine ratio between sorghum and maize.

1079 GIMENO, A. 1983. Rapid thin layer chromatographic determination of zearalenone in corn, sorghum, and wheat. Journal of the Association of Official Analytical Chemists 66(3): 565-569. 29 ref.

A rapid method is described for determining zearalenone in corn, sorghum, and wheat. The mycotoxin is extracted with a mixture of acetonitrile and 4% of KCl in HCl. The extract is cleaned up with isooctane, evaporated, and

redissolved in chloroform. Zearalenone is separated by TLC; identity is confirmed with various developing solvents and spray reagents. Zearalenone is then quantitated by the limit detection method. The minimum detectable concn. is 140-160 micro g/kg when aluminium chloride solution is used as spray reagent, and 85-110 micro g/kg when Fast Violet B salt is used as spray reagent.

1080 GLENNIE, C.W. 1983. Polyphenol changes in sorghum grain during malting. Journal of Agricultural and Food Chemistry 31(6): 1295-1299. 27 ref.

Bird-resistant and non-bird-resistant sorghum cultivars were malted to study the effects of tannin on malting as well as the change in polyphenols during malting. No difference could be found in the per cent germination nor in the root and shoot production of the malts of the two cultivars. There was an increase in the anthocyanidin content of the roots and shoots during malting. Since there was also an increase in the anthocyanidin content of the non-bird-resistant kernels, it would appear that there is no migration of anthocyanidins from the kernels to the roots and shoots. A transmission electron micrograph of the testa after malting showed a testa very similar to that before malting. The tannin in the bird-resistant sorghum picked up extra protein or peptides during malting.

1081 HAHN, D.H., FAUBION, J.M., and ROONEY, L.W. 1983. Sorghum phenolic acids, their high performance liquid chromatography separation and their relation to fungal resistance. Cereal Chemistry 60(4): 255-259. 17 ref.

Sorghum grain resistant to fungal attack contained both a greater variety and larger amounts of the identified phenolic acids and unknown compounds than did susceptible varieties. Resistant sorghums also had a greater percentage of their total, identified phenolic acids in the free form. However, resistance to fungal attack could not be attributed solely to phenolic acid content or profile. Tannin content and physical characteristics of the grain also contribute to fungal resistance.

1082 HAHN, D.H., ROONEY, L.W., and FAUBION, J.M. 1983. Effect of genotype on content and distribution of sorghum phenols. Cereal Foods World 28(9): 559-560. (Abstract).

Phenols of the whole grain, pericarp, testa and endosperm were characterized by HPLC and colorimetric methods. The presence of a testa (dominant B1 and B2) increased the level of phenols in the pericarp. Phenolic compounds were present in the peripheral layers even in varieties without pigmented testae. A dominant S gene increased the level of phenols and decreased the degree of polymerization of the tannins in the pericarp and testa.

1083 HEUPEL, R.C., and NES, W.D. 1983. An analysis of polycyclic isopentenoid and, lipid biosynthesis in sorghum and its functional implication. Plant Physiology 72(1, suppl.): 170. (Abstract).

The specific activities of the sterol and long chain fatty alcohols (LCFA) fractions are consistent with a non-metabolic architectural role for sterols in membranes and for LCFA in the epicuticular wax. The high specific activity of the pentacyclic triterpenoids fraction

did not support a structural role for these compounds.

1084 HORINO, T., HARAKI, T., and AE, N. 1983. Phosphorus, potassium and magnesium contents and their balance in cereal grain. (Ja). Japanese Journal of Crop Science 52(4): 461-467. 20 ref. (Summary:En).

The dry-ashed materials of whole kernels of 36 cultivars of sorghum and other cereals were analyzed by a colorimetric procedure for P, a flame photometry for K and an atomic absorption spectrometry for Mg. Mg/K chemical equivalent ratio as a predictor of grain quality was examined. Most of the cereals used for human consumption marked the ratio within 1.25 to 2.0 approximately. These cereals contain more Mg than K in chemical equivalence.

1085 JAMBUNATHAN, R., RAO, N.S., and GURTU, S. 1983. Rapid methods for estimating protein and lysine in sorghum (Sorghum bicolor (L.) Moench). Cereal Chemistry 60(3): 192-194. 13 ref.

Sorghum samples were analyzed for protein by the Technicon auto analyzer (TAA) method, and the results were compared with the micro-Kjeldahl method. The TAA method was highly and significantly correlated (r=0.997**) with the micro-Kjeldahl method, and the results were found to be highly reliable for routine screening of samples. Lysine was estimated by the rapid dye-binding capacity (DBC) procedure and was determined using an amino-acid analyzer. The results of the DBC procedure, when expressed as a ratio with respect to the protein content, were highly and positively correlated (r=0.933**) with the amino-acid analyzer values. The rapid procedures of TAA and DBC were observed to give reliable estimates of protein and lysine content, respectively, and are recommended when large numbers of sorghum samples are to be analyzed.

1086 KONDRAT'EV, K. YA, GRINENKO, L.A., KOZODEROV, V.V., and FEDCHENKO, P.P. 1983. Determination of chlorophyll content in leaves of green plants. Doklady Botanical Sciences 268-270: 35-37. 2 ref. (Translated from Doklady Academii Nauk SSSR 270(2): 505-508. 1983).

Green leaves of sorghum and other plants were subjected to photometry. The leaves were placed in alcohol until complete chlorophyll was extracted and again subjected to photometry. The relationship between spectral reflective characteristics of leaves and chlorophyll content was specific. The accuracy of the determination of chlorophyll content from color coordinates also depended upon the spectral coefficients of reflection of the leaf itself.

1087 LEHLE, F.R., and PUTNAM, A.R. 1983. Allelopathic potential of sorghum (Sorghum bicolor): isolation of seed germination inhibitors. Journal of Chemical Ecology 9(8): 1223-1224. 14 ref.

The major inhibitory components obtained after fractionation of an aqueous extract of sorghum herbage were quantified in terms of biological potency by indexing 3 aspects of cumulative cress seed germination. The inhibitory potential expressed in the crude aqueous extract reflected a complex interaction of numerous individual components of diverse chemical compositions and potencies. Some of these inhibitory components included chemical classes not previously associated with herbage phytotoxicity.

1088 MCBEE, G.G., and MANESS, N.O. 1983. Determination of sucrose, glucose and fructose in plant tissue by high-performance liquid chromatography. Journal of Chromatography 264(3): 474-478. 14 ref.

This paper describes a rapid procedure to extract, and quantify for sucrose, glucose and fructose in oven-dried ground sorghum tissue using a cation-exchange resin column (sq. Ca +) and protective precolumns.

1089 MCBEE, G.G., WASCOM, R.M., III, MILLER, F.R., and CREELMAN, R.A. 1983. Effect of senescence and nonsenescence on carbohydrates in sorghum during late kernel maturity states. Crop Science 23(2): 372-376. 18 ref.

A senescent, hybrid cv. 37 and 3 nonsenescent, hybrid cv. P5, 65, and 6R were harvested at 3 stages of maturity. The results suggest that sweet culms do not reduce grain weights. Culm sugar accumulation patterns differed among cv. Patterns exhibited by P5 and 65 appeared to be desirable for grain production and possibly as biomass for energy use since the culms continued to fill with sugar after black layer (BL). The nonsenescing cv. contained significantly more carbohydrates at all maturity stages than the senescing one. Plants with panicles removed at BL had accumulated more culm carbohydrates at Post black layer than reported above in most cases.

1090 MCMILLIAN, W.W., WILSON, D.M., and WIDSTROM, N.W. 1983. Aflatoxin and zearalenone contamination in grain sorghum samples collected in Georgia fields in 1982. Sorghum Newsletter 26: 122.

A sampling of preharvest grain sorghum in 25 fields in Georgia, USA revealed 84% incidence of aflatoxin contamination. Grain samples negative for aflatoxin were also negative for zearalenone. Suspected mycotoxicosis in grain fed swine were also reported.

1091 MCMILLIAN, W.W., WILSON, D.M., MIROCHA, C.J., and WIDSTROM, N.W. 1983. Mycotoxin contamination in grain sorghum from fields in Georgia and Mississippi. Cereal Chemistry 60(3): 226-227. 10 ref.

Samples of preharvest grain from 64 grain sorghum fields in the Georgia coastal plain in 1980 and 1981, demonstrated a 56% incidence of aflatoxin contamination ranging in levels from 1 to 90 ppb. In addition, 31% of the grain samples were contaminated with levels of zearalenone ranging from 2 to 1.468 ppb. The findings confirm the presence of mycotoxins in grain sorghum maturing in the fields. A 1981 survey of 15 fields in the Mississippi Delta found no detectable levels of aflatoxin or zearalenone. The data suggest that, although mycotoxins are present in samples of preharvest grain sorghum, the problem was not severe as in preharvest corn, Zea mays L., produced in the Southeast. The relatively high incidence of field contamination could result in elevated levels of mycotoxins during storage of this grain.

1092 OBERTHUR, E.E., NICHOLSON, R.L., and BUTLER, L.G. 1983. Presence of polyphenolic materials, including condensed tannins, in sorghum callus. Journal of Agricultural and Food Chemistry 31(3): 660-662. 20 ref.

With age, callus tissue of sorghum forms relatively large amounts of phenolic materials. Among those present are polyphenols which strongly bind and precipitate

proteins and which respond to tests for condensed tannins (proanthocyanidins). Condensed tannins have not previously been found in vegetative tissue of sorghum, although their presence in seed has been well established. Like the condensed tannins from seed, those from callus tissue of the same cultivar cannot be extracted with methanol but are readily extracted by acidic methanol.

1093 PIERSON, E.E. 1983. Relationship of ferrous iron, total iron, and iron deficiency in iron tolerant and susceptible crop plants. Ph.D. thesis, University of Nebraska, Lincoln, Nebraska, USA. 164 pp.

Ferrous and total iron was determined in the genotypes of sorghum and other crops, tolerant and susceptible to iron deficiency. Ferrozine was the best reagent to chelate ferrous iron, and ferrous iron could be extracted within 30 minutes from leaf tissues. Higher ferrous and total iron was found in fresh samples than in dried samples.

1094 SCHAKE, L.M., ELLIS, W.C., SUAREZ, W.A., and RIGGS, J.K. 1983. Composition and yield of sorghum grain hybrids grown at Bushland and College Station. Progress Report, Texas Agricultural Experiment Station 4141: 80-89.

Hybrid sorghums were cultured at Texas, USA to estimate composition and yield of whole plant, leaf, head and stem at 10 harvest intervals. It was found that the advancing plant maturity increased whole plant dry matter yield up to 150 days post-planting, but the optimum combinations of yield and nutritional potential for cattle could be obtained as early as 100 days post-planting. Composition of some plant portions was influenced by cultural conditions x maturity interactions, but not by variety.

1095 STARK, J.R., AISIEN, A.O., and PALMER, G.H. 1983. Studies on starches from Nigerian sorghum. Starch/Staerke 35(3): 73-76. 22 ref. (Summary:De).

Two cvs. of white Nigerian sorghum were examined for total lipid, protein and carbohydrate content. The levels of sucrose, raffinose, fructose and glucose in the ungerminated grain were measured and the starches isolated and purified. Amylose to amylopectin ratios, solubility properties, gelatinization temperature, size distribution and alpha and beta amylolysis limit of the granules were analysed. Fractionation and chemical analyses of the large and small granules revealed that the amylose to amylopectin ratios of both types of granules were similar. Full results are shown graphically and in tables.

1096 SUBRAMANIAN, V., BUTLER, L.G., JAMBUNATHAN, R., and RAO, K.E.P. 1983. Some agronomic and biochemical characters of brown sorghums and their possible role in bird resistance. Journal of Agricultural and Food Chemistry 31(6): 1303-1307. 27 ref.

Chemical composition including tannin content and grain and agronomic characters including earhead length, head type, glume color, and threshability are reported for 18 sorghum genotypes with brown pericarp color, 15 of which had been reported to be bird resistant. Agronomic characters varied significantly among the genotypes. Variation in tannin content was much larger than variation in the other constituents. Detailed polyphenol analysis on selected genotypes indicated that some lines had insignificant levels of condensed

tannins, that none of them was a group II sorghum, and that the levels of flavan-4-ols were relatively high. The possible role of polyphenolic components in relation to bird resistance is discussed.

1097 SUBRAMANIAN, V., JAMBUNATHAN, R., and SEETHARAMA, N. 1983. Biochemical changes during seed development in sorghum (Sorghum bicolor). Phytochemistry 22(5): 1097-1101. 19 ref.

Grain dry weight accumulation, soluble sugars, starch, protein, fat and ash contents were studied in developing grains of 8 sorghum cv. The dry matter increased gradually from fertilization up to 35 days after flowering. Variation in sugars and starch accumulation was observed for the cv. The starch contents of high lysine mutant P-721, and high lysine lines IS-11167 and IS-11758 were comparatively lower and their protein contents were higher, suggesting a possible mechanism for protein accumulation at the expense of starch accumulation. RY-49 had a higher protein accumulation rate at various phases of maturation. The fat content also tended to increase up to 28 days and the rate of accumulation was higher for RY-49 and IS-11167.

1098 SUMMERS, K.A., KIRLEIS, A.W., and NIELSEN, N.C. 1983. Characterization of sorghum prolamins. Plant Physiology 72(1, suppl.): 30. (Abstract).

When kafirin, the prolamin of the sorghum endosperm is subjected to polyacrylamide gel electrophoresis in the presence of sodium dodecyl sulfate, it is composed of 3 size classes of polypeptides. However, when it is subjected to acid-urea polyacrylamide gel electrophoresis, there are at least 16 bands indicating substantial charge heterogeneity. Reverse phase high performance liquid chromatography has been used to separate kafirin into a number of individual components. The comparison of amino acid sequences of individual kafirins reveals several subfamilies of related polypeptides and shows distinct homology between kafirin and zein proteins.

1099 THENTE, K. 1983. HPLC analysis of component sugars in fibre polysaccharides from cereals. Developments in Food Science 5A: 477-482.

The use of HPLC to determine fibre sugars in cereals such as barley and sorghum is described.

1100 WAHI, S.P., JAIN, V.K., SHARMA, V.D., PRAKASH, D., and SINHA, P. 1983. Studies on starches isolated from Sorghum vulgare Linn. and Paspalum scrobiculatum Linn. Indian Journal of Pharmaceutical Sciences 45(2): 85-87. 6 ref.

The microscopial and physical properties of sorghum starches are reported.

1101 WANG, F.J., XANG, B.F., and CHE, J.C. 1983. A preliminary study on the dye-binding method for the simultaneous determination of seed protein and lysine in cereals. (Ch). Acta Agriculturae Universitatis Pekinensis 9(4): 63-70. 9 ref. (Summary:En).

Correlations obtained between N determined by the Kjeldahl method and dye-binding protein analyses were good. Lysine values of dye-binding method were in agreement with total lysine values determined with an amino acid analyser. 40 samples could be analysed per operator per day. The method is recommended for routine analysis.

1102 WATTERSON, J.J., and

BUTLER, L.G. 1983. Occurrence of an unusual leucoanthocyanidin and absence of proanthocyanidins in sorghum leaves. Journal of Agricultural and Food Chemistry 31(1): 41-45. 32 ref.

Condensed tannins of sorghum seeds could, if also present in vegetative tissue, lower the digestibility of the forage. In order to eliminate interference by pigments such as chlorophyll and anthocyanins in tannin assays of forage, tannin and related flavanols are absorbed on insoluble polyvinylpyrrolidone (PVP). After washing out interfering materials the PVP in HCl/butanol was heated to convert the bound tannins to anthocyanidins which are measured spectrophotometrically. By use of this assay, no tannins were found in leaf tissue of the 47 sorghum lines examined. However, leaf tissue from 16 of the lines was found to contain a PVP-binding material with properties corresponding to a monomeric flavan-4-ol (designated a leucoanthocyanidin). The leucoanthocyanidin, which is also present in seed of these varieties, has been tentatively identified as apiforol (4',5,7-trihydroxyflavan-4--ol). This unusual monomeric flavan-4-ol, which has not been previously reported from plants, yields the yellow anthocyanidin, apigeninidin, when heated in aqueous acid and at low temperatures.

1103 WEBER, E.J. 1983. Genetic diversity in cereal lipids. Pages 195-200 In Progress in cereal chemistry and technology. pt. A. Proceedings of the Seventh World Cereal and Bread Congress, 28 June - 2 July 1982, Prague, Czechoslovakia (Holas, J., and Kratochvil, J., eds.). Amsterdam, Netherlands: Elsevier. 12 ref.

Cereals show wide ranges of genetic variability in oil content, fatty acid composition and other lipid components of the grain. Higher oil lines of maize, oats and sorghum have been produced. Oleic and linoleic acids show an inverse relationship when the fatty acid composition of cereals are altered genetically. Breeding to change the fatty acid compositions of an oil (triglyceride) also affect the fatty acid composition of the phospholipids.

1104 WIESER, H., SEILMEIER, W., EGGERT, M., and BELITZ, H.D. 1983. Tryptophan content of protein fractions from different cereals. (De). Zeitschrift fuer Lebensmittel-Untersuchung und-Forschurg 177(6): 457-460. 9 ref. (Summary:En).

The tryptophan contents of the albumin, globulin, prolamine and glutelin fractions from wheat, rye, barley, oat, sorghum, rice, maize were estimated by HPLC after alkaline hydrolysis. Complete amino acid compositions, including the amide contents, are given for all these protein fractions.

1105 WILSON, C.M. 1983. Seed protein fractions of maize, sorghum, and related cereals. Pages 271-307 In Seed proteins: biochemistry, genetics, nutritive value (Gottschalk, W., and Muller, H.P., eds.). The Hague, Netherlands: Martinus Nijhoff. 140 ref.

In this review, previous reviews and the original literature are used to prepare an outline of protein fractions of sorghum and related cereals.

1106 YADAV, S.P., and RANA, B.S. 1983. Tannin content at different stages of grain development in some bird susceptible and resistant sorghums. Current Science 52(17): 804-806. 5

ref.

Some Quelea quelea resistant and susceptible varieties were analysed for the genotypic difference in tannin content at Busia, Kenya. The tannin content per 100 mg grain of resistant, moderately resistant, and susceptible varieties was 1.08 mg, 0.77 mg and 0.35 mg at milk stage and 0.658 mg, 0.436 mg, and 0.262 mg at dough stage respectively.

1107 ZUNIGA, G.E., ARGANDONA, V.H., NIEMEYER, H.M., and CORCUERA, L.J. 1983. Hydroxamic acid content in wild and cultivated gramineae. Phytochemistry 22(12): 2665-2668. 19 ref.

Hydroxamic acids, DIMBOA and DIBOA were determined in gramineae including sorghum by the FeCl3 and TLC-UV procedures. The sorghum x sudangrass hybrid tested lacked these acids.

POSTHARVEST OPERATIONS

1108 ADEYEMI, I.A. 1983. Dry-milling of sorghum for ogi manufacture. Journal of Cereal Science 1(3): 221-227. 20 ref.

Production of dry-milled flour for ogi, a porridge in Nigeria is described. The quality of ogi was compared with that of ogi prepared by the wet-milling process. With dry-milling the yield of ogi ranged from 12-90%, and 60% from wet-milling process. Titratable acidity was lower from ogi prepared by dry-milled sorghum than by wet-milled sorghum. The advantages of dry-milling over wet-milling are discussed.

1109 ALI, M.R., and WILLS, R.B.H. 1983. Milling and cooking of hybrid sorghum grain. Qualitas Plantarum Plant Foods for Human Nutrition 32(1): 59-66. 18 ref.

Milling of 14 commercial sorghum hybrids gave a high yield of unbroken kernels with the germ attached but the presence of the hilar and germ in all cv. detracted from the appearance of the grain. The cooking time of milled grain of all cv. was exceptionally high.

1110 BAKKER-ARKEMA, F.W., FEDEWA, G., SCHISLER, T.P., and BALLINGER, M. 1983. Drying of food sorghum for starch manufacturing. Paper, American Society of Agricultural Engineers no. 83-6526. 12 pp. 15 ref.

The design of a commercial three-stage concurrent-flow (CCF) drier for food sorghum is presented. The design was based on experimental data obtained with a pilot-scale one-stage CCF drier, and on theoretical data from a simulation model. The drier was built at a sorghum starch-manufacturing plant in the Sudan.

1111 CHANG, C.S., CONVERSE, H.H., and MARTIN, C.R. 1983. Bulk properties of grain as affected by self-propelled rotational type grain spreaders. Transactions of the ASAE 26(5): 1543-1550. 11 ref.

A self-propelled rotational 4-trough grain spreader constructed at the U.S. Grain Marketing Research Laboratory and two commercially available rotational type grain spreaders were used to fill a 6.4-m diameter bin with wheat, corn, and grain sorghum. The bulk density and airflow resistance of grain transferred into a bin by spreaders were higher than those for grain transferred without a spreader. At the same airflow rate, the power required to move air through the grain transferred into a bin by spreaders

was higher than that for grain transferred without a spreader.

1112 GANNO, K., IRIE, M., and GOTO, Y. 1983. Studies on the combine harvesting, drying and preparing methods of grain sorghum. (Ja). Bulletin of the Chugoku National Agricultural Experiment Station, Series A 31: 1-22. 27 ref. (Summary:En).

Four combine harvesters were compared for their performance in sorghum harvesting. The losses of transporting units and threshing units were estimated. At slow operating speeds the losses were greater. Drying was uneven under high m.c. Test huller was found most suitable for grain processing.

1113 MBENGUE, H.M. 1983. Decortication and mechanical dry grinding of ameliorated varieties of sorghum in Senegal. (Fr). Dakar, Senegal: Ministere du Developpement Rural. 7 pp.

1114 MURILLO SOLANO, J., and CAMACHO GALEANO, C. 1983. Evaluation of losses of sorghum in combined equipment (harvester). (Es). Thesis, Universidad Nacional de Colombia, Medellin, Colombia. 91 pp. 9 ref.

1115 OOMAH, B.D., REICHERT, R.D., and YOUNGS, C.G. 1983. Milling characteristics of some sorghum varieties. Sorghum Newsletter 26: 97.

The tangential abrasive dehulling device (TADD) appears to be a useful tool for the determination of sorghum grain hardness and milling quality, and for the rapid preparation of dehulled grain samples which can subsequently be used for other quality evaluations.

1116 PERTEN, H. 1983. Practical experience in processing and use of millet and sorghum in Senegal and Sudan. Cereal Foods World 28(11): 680-683. 8 ref.

Experience in Senegal and Sudan demonstrated that sorghum and millet flours could be industrially produced, and consumers were willing to pay higher prices for flour produced from decorticated grain than for traditional flours. Milling technology applied to these cereals revealed new prospects for industrial processing.

1117 SAADAN, H.M. 1983. Post harvest technology of sorghum in Tanzania. Sorghum Newsletter 26: 100.

Peasant farmers of Tanzania and how they handle the sorghum crop after harvest is discussed. Major problems in post harvest technology in Tanzania are identified as inadequate storage facilities, storage pests and lack of milling equipment to produce shelf-stable, milled products.

1118 SAADAN, H.M., ROONEY, L.W., and MILLER, F.R. 1983. Milling techniques that provide reliable indices of sorghum milling properties. Sorghum Newsletter 26: 104. 1 ref.

The modified Udy mill, the barley pearler and IDRC mill had mean decorticated grain yields of 82.5, 69.3 and 63.5% respectively. Each of the mills were useful in evaluating sorghum milling properties. The Udy mill was useful as a preliminary screening technique. Plant colour affected milling properties. Sorghum with tan plant colour produced greatest yield of decorticated grain.

1119 SCHEURING, J.F., SIDIBE, S., ROONEY, L.W., and EARP, C.F. 1983. Sorghum pericarp thickness and its relation to decortication in a wooden mortar and pestle. Cereal Chemistry 60(1):

86-89. 9 ref.

Differences in decortication during traditonal manual milling of sorghums with different pericarp thickness but with similar endosperm hardness were studied in Mali. An inverse relationship was noticed between pericarp thickness and time required for decortication. Scanning electron microscopy of kernels with the three different pericarp types revealed differences in pericarp structure. Data on grain characteristics, average manual decortication time and endosperm recovery and on milling properties with contrasting pericarp thickness are tabulated.

1120 VERMA, L.R., and NOOMHORM, A. 1983. Moisture determination by microwave drying. Transactions of the ASAE 26(3): 935-939. 14 ref.

A study was conducted to evaluate the use and accuracy of a household microwave oven for quick moisture determination of sorghum leaves, wheat, soybeans and rough rice. Standards used for comparison were ASAE procedures for forages and AOAC procedure for rough rice. Moisture values by a Motomco meter were also compared with the standard used for the grains. The microwave oven gave accurate results for high moisture sorghum leaves, wheat and rough rice, but the accuracy was lower for soybeans.

SEEDS AND SEED PRODUCTION

1121 AMARAL, A. DOS S. 1983. Early aging - a test of seed vigour. (Pt). Lavoura Arrozeira 36(343): 24-25.

Sorghum seeds were submitted to a temperature of 45 deg C at 100% relative humidity for 72 hrs for testing seed vigour under field conditions.

1122 ANDREW, M.H., and MOTT, J.J. 1983. Annuals with transient seed banks: the population biology of indigenous Sorghum species of tropical North-west Australia. Australian Journal of Ecology 8(3): 265-276. 25 ref.

Studies on the dormancy characteristics, seedling emergence, plant survival, growth and reproductive success, and of seed bank changes were made for one Sorghum intrans population and for 3 S. stipoideum populations over two growing seasons. On wetting, 90% of the non-dormant, viable seeds of all species germinated within 5 days. The temperature range for opt. germination was 25 - 35 deg C, and germination declined with decreasing water potential. For S. intrans and S. stipoideum height and tiller number increased from emergence to floral initiation. Most vegetative tillers died leaving a single reproductive culm reaching 1-4 m at maturity. All species had transient seedbanks, formed at seedfall at the end of one rainy season and exhausted by germination following the first rains of the next rainy season.

1123 BAPAT, D.R., PURANDARE, S.L., PATIL, R.C., SHINDE, M.D., PADHYE, A.P., and DHANDE, P.H. 1983. Isolation distance studies in sorghum. Sorghum Newsletter 26: 10-11. 1 ref.

Reports experiments to determine the isolation distance of crops for seed production. The dissemination of pollen from CSH-1 seed production plots were all around a Swarna planted plot. Concludes that a distance of 200 m is sufficient for certified seed

production.

1124 HALLGREN, L., and MURTY, D.S. 1983. A screening test for grain hardness in sorghum employing density grading in sodium nitrate solution. Journal of Cereal Science 1(4): 265-274.

1125 JOSHI, M.K., RADDER, G.D., and PATIL, V.S. 1983. Study of synchronisation of flowering in parental lines of hybrid sorghum CSH-5. Seed Research 11(2): 217-224. 8 ref.

Perfect synchronisation of flowering, higher seed set (77.79 per cent) and maximum hybrid seed yield (18.36 q/ha) was achieved by manipulation in N application to female parent viz., applying additional 30 kg N ha at 30 days and 20 kg N per ha through 4 foliar sprays at 20, 30, 40 and 50 days. Foliar spray of 250 ppm GA at 50 days to female parent also caused perfect synchronisation of flowering, greater seed set (69.89 per cent) and higher seed yield (17.67 q/ha). Foliar application of maleic hydrazide to male parent either at 25 days or at 50 days, as well as delayed sowing of male parent by 4, 8 and 10 days were not effective. A significant positive correlation was observed between per cent seed set and seed yield. Nitrogen content in the plant and rate of dry matter production in female parent at earlier stages of growth had significant negative correlation with days to flower primordia initiation. A significant negative correlation was also observed between the difference in days to 50 per cent flowering of male and female parents and per cent seed set.

1126 KABEERE, F. 1983. Difficulties encountered in the production of high quality seeds in Uganda. Seed Science and Technology 11(3): 1087-1092. 3 ref. (Summaries:De, Fr).

The high demand for seed of food crops stimulated the establishment of the Uganda Seed Multiplication Scheme in 1968. With British Government financial and technical assistance the scheme was improved and the basic organisational structure was established in 1970. The scheme is controlled by the Ministry of Agriculture and Forestry and consists of the following units:management, seed production, seed processing, seed marketing and distribution, and seed quality control. The major crops handled by the scheme are: maize, sorghum, finger millet, groundnuts, beans and soyabeans. More than 1500 tonnes of seed were produced by the scheme in 1974 but due to difficult political and economic conditions the production dropped to less than 200 tonnes annually and the quality of seeds declined. The impact of the scheme on crop production has therefore been small. Steps are now being taken to rehabilitate the seed project so as to improve the quantity and quality of seeds produced.

1127 MALI:MINISTERE DE L'AGRICULTURE, SECTION DE REGLEMENTATION ET DE CONTROLE DES SEMENCES SELECTIONNEES. 1983. Technical indexes on the multiplication and sampling of selected seeds of millets, sorghums, rice, maize, groundnut and beans: season 1983-1984 Mali. (Fr). Bamako, Mali: Institut d'Economie Rurale. 82 pp.

1128 NAGY, B., and LAZANYI, J. 1983. Chemical desiccation of grain sorghum with Reglone. Sorghum Newsletter 26: 49-50. 4 ref. [Also on p. 6].

The effect of Reglone treatment on grain drying was accelerated and the seed moisture content decreased

significantly. On the average, a decrease of 7.42% 8 days was measured in the first year. The control was 3.12% 8 days. Seed moisture content decreased 7.73% 7 days in the second year when plots were previously treated and 5.70% 7 days for the untreated control. Germination of seed increased and thousand grain weight decreased due to treatment.

1129 SEVILLA, E.P., and GUERRERO, F.C. 1983. Production of quality seed in the Philippines. Seed Science and Technology 11: 1139-1144. (Summaries: De, Fr).

The seed certification schemes initiated by the Central Seed Testing Laboratory, Philippines includes sorghum. The strategy adopted by the government for high quality seed production is described.

1130 SIDHU, M.S., and GILL G.S. 1983. Effect of foliar application of nitrogen and cycocel on growth and seed yield of sorghum. Journal of Research, Punjab Agricultural University 20(3): 236-240. 7 ref.

The rate of cycocel applied either as spray or seed treatment did not affect the seed yield. Application of 60 kg N/ha was ineffective. Foliar spray of urea at boot stage was as good as top dressing. Urea spray did not change protein content in seed as well as in stalk.

1131 UMASHANKAR, M., and BOMMEGOWDA, A. 1983. Hybrid seed production studies in CSH-5 sorghum. Sorghum Newsletter 26: 7-8.

A field study was made at Agricultural College, Bangalore, India, during 1980-81 on a red sandy loam soil with supplemental irrigation on CSH-5 sorghum hybrid seed production. The male flowered earlier than the female. Panicle weight, grain weight per panicle, 1000-grain weight, panicle length, panicle width and the seed yield were significantly higher in the female than in the male. Sowings made in the first week of November and the last week of December gave higher seed yield than other dates of sowing. Staggered sowing of parental lines gave the highest seed yield. Sowing of the seed parent earlier than male parent resulted in maximum synchronization of flowering and hybrid seed set.

UTILIZATION

Feeds

1132 AHMED, F.A., and AHMED, A.I. 1983. Intake and digestibility of berseem (Medicago sativa) and sorghum Abu 70 (Sorghum vulgare) forages by Sudan zebu cattle and desert sheep. Tropical Animal Health and Production 15(1): 7-12. 19 ref. (Summaries:Es, Fr).

The intake of berseem was higher than sorghum in both cattle and sheep. There was no significant difference in dry matter digestibility between berseem and sorghum by cattle. Sheep digested berseem better than sorghum.

1133 AKITA, T., MATSUDA, H., MORIMOTO, Y., and NAKAI, S. 1983. Studies on the making of whole crop silage preparation by dual purpose sorghum. 2. Effects of preparation method on silage quality. (Ja). Bulletin of Hyogo Prefectural Experiment Station of Animal Husbandry 20: 94-96.

1134 ANTONGIOVANNI, M., and GRIFONI, F. 1983. Sorghum for animal feeding. (It). Informatore Zootecnico 30(3): 35-39.

1135 ATECA MARTINEZ, J.F. 1983. Incorporating different levels of Sorghum vulgare technicum as substitute of maize in rations for rearing and fattening pigs. (Es). Thesis, Universidad de Concepcion, Chillan, Chile. 58 pp. 23 ref. (Summary:En).

1136 CAIRNIE, A.G. 1983. U''lization of Sorghum almum Parodi a pasture for fattening steers in the Pampean Semi-arid Region. (Es). Revista Agrarius. pp. 36-42. 13 ref. (Summary:En).

It is concluded that Sorghum almum is a palatable forage that do not produce toxicity in beef cattle when it is used after the plants are 0,70-1 m. high. The carrying capacity is 1,2-2,5 steers/ha, (375 to 1,000 kg/ha) during 100 - 120 days (from Jan - Apr) until the first frost with temperature below -3 deg C, occur. Daily weight gains in steers were 0,500 to 0,700 kg, during that period, with a beef production of 100-150 kg/ha.

1137 CAPIO, E.T. 1983. Substitution of sorghum (Sorghum bicolor (L.) Moench) and rough rice (Oryza sativa L.) for corn in the ration of broilers. M.S. thesis, University of the Philippines at Los Banos, College, Laguna, Philippines. 59 pp. 43 ref.

Results obtained in the feeding trial of corn and sorghum showed that substituting corn with sorghum in the diet of broilers decreased its palatibility. Gain in weight and feed efficiency were not affected. The crude protein digestibility of the rations were comparable except when sorghum replaced totally the corn in the rations. Dry matter digestibility decreased significantly when increasing level of corn was replaced by sorghum in the rations.

1138 CARDOZO, E.L., RITCHIE, H.D., ERICKSON, R.W., and SCHWAB, G.D. 1983. Performance of yearling steers on four pasture grazing systems. Research Report, Michigan Agricultural Experiment Station 444: 232-241. 37 ref.

A combination of rye/sorghum-sudangrass was one of the 4 treatments on Holstein steers at Michigan, USA. Average daily gain from this treatment was 1.88 lb/steer.

1139 CASWELL, L.F., KALMBACHER, R.S., and MARTIN, F.G. 1983. Yield and silage fermentation characteristics of corn, sweet sorghum, and grain sorghum. Proceedings, Soil and Crop Science Society of Florida 42: 139-142. 11 ref.

This study was conducted to compare yield, fermentation and quality parameters of corn, sweet sorghum and grain sorghum silages. These three crops were grown March to November 1976, and total dry matter (DM) yield of corn was 24.0 Mg/ha vs. 46.9 and 29.9 Mg/ha for sweet and grain sorghum. Corn and grain sorghum silages had lower percentages of water soluble carbohydrates (WSC) at ensiling and lower percentages of WSC used in the fermentation process. These crops also had lower unit changes in DM and IVOMD as a result of ensiling. Sweet sorghum made excellent silage but much of its value was lost in the fermentation process because of the high initial sugar concentration. Corn and grain sorghum generally had less production problems resulted in better silages.

1140 CHAUHAN, T.R., and RANDHAWA, S.S. 1983. Comparative study on the yield and nutritive value of sorghum fodder hay. Indian Journal of Animal Sciences 53(9): 1013-1015. 4 ref.

Feeding value of sorghum fodder, as hay, when harvested at 70, 80, and 90 days after sowing was evaluated. Sorghum harvested after 70 days of sowing when it gave more than 50% ears had lower nutritive value than that harvested before this time.

1141 CHOPRA, G., and PARSHAD, V.R. 1983. Food preferences of short-tailed bandicoot rat Nesokia indica (Gray). Indian Journal of Ecology 10(2): 316-321. 13 ref.

Whole grains, cracked grains and flours of wheat, millet, sorghum, rice, maize, gram, and groundnut were provided to 10 rats in 'no-choice' and later in 'choice.' The rats preferred maize flour, cracked wheat and wheat flour over all others. It is suggested to use them in poison baits.

1142 COOK, C.W., WALKER, J.W., EBBERTS, M.H., RITTENHOUSE, L.R., BARTLETT, E.T., CRAMER, C.A., FAGERLIN, P.T., and MCKEAN, M.C. 1983. Alternative grass and grain feeding systems for beef production. Bulletin, Colorado State University Experiment Station no. 579S (revised). 83 pp. 82 ref.

Winter weaned steers on forage sorghum gained significantly more weight than on other grasses even though there was variation according to season, yr and steer frame size. Final wt. of grain-fed steers was directly related to length of feeding period but av. daily gain was inversely related to length of feeding period.

1143 COSER, A.C., and MARASCHIN, G.E. 1983. Animal performance in pastures of pearl millet and sorghum. (Pt). Pesquisa Agropecuaria Brasileira 18(4): 421-426. 23 ref. (Summary:En).

Pearl millet and sorghum, cv. Sordan NK were evaluated under continuous grazing in an experiment carried out in Brazil concerning dry matter production, growth rate, carrying capacity, "in vitro" digestibility and live weight gain per animal and per hectare. Two crossbred heifers to maintain similar forage availability were used, in a randomized block arrangement with three replications. Both forage species were similar in all the parameters cited, but pearl millet did show higher biological value than sorghum.

1144 CRUZ, I., and SANTOS, J.P. 1983. Comparison of Mocis latipes biology in artificial diet and in corn and sorghum leaves. (Pt). Pesquisa Agropecuaria Brasileira 18(2): 85-90. 6 ref. (Summary:En).

The biology of Mocis latipes Guenee 1852, reared on an artificial bean diet and also on corn and sorghum leaves, was studied, in Brazil. There were no significant differences in larval development between individuals reared on corn or sorghum leaves. On the average, the larval, pupal, and larva-adult periods lasted 19.5, 9.6 and 28.9 days, respectively. The average pupal weight was 302 mg. Mortality rates were 11.3 and 0.5% for larvae and pupae respectively for individuals reared on corn leaves and 11.5 and 2.9% for sorghum. The artificial diet was unsatisfactory due to the high mortality rate (55%), and also a reduction in the width, length and weight of pupae of 26.1, 14.3 and 38%, respectively, compared to individuals reared on natural diet.

1145 CUNHA FILHO, E., GONDIM, F.A.L., and MORAES-SANTOS, T. 1983. Sorghum and pellagra-like disease. 2. Pyridine nucleotides in liver and erythrocyte of chicks.

Nutrition Reports International 27(5): 1029-1038. 16 ref.

Pellagra-like disease was provoked in chicks by feeding them a sorghum diet supplemented or not with niacin. Chicks fed a control diet with or without addition of leucine for a period of 31 days post-hatching were used for comparison. On days 18th and 31st pyridine nucleotides (NAD+, NMN+, NADP+) were determined in erythrocyte and liver by fluorometric procedures after chromatographic separation. The results showed that dietary sorghum decreased the level of NADP+ in younger animals. Fortification of this diet with niacin resulted in increased levels of NAD+ but not of NADP+. Addition of leucine to the diet had no effect on the animals when compared with controls. The effect of sorghum was not observed in older chicks. The results suggest that the biosynthesis of NADP+ from NAD+ is impaired and that low level of NADP+ is linked to the development of pellagra.

1146 DANIELS, L.B., SMITH, M.J., STALLCUP, O.T., and RAKES, J.M. 1983. Nutritive value of ensiled broiler litter for cattle. Animal Feed Science and Technology 8(1): 19-24. 15 ref.

In a trial, broiler litter consisting of chopped wheat straw bedding, excreta, wasted feed and feathers was ensiled for 28 days at approximately 45% dry matter. The litter was ensiled as: (1) litter alone; (2) litter plus Irish potato cannery waste; (3) litter plus ground maize, and (4) litter plus ground grain sorghum. The materials added supplied 33% of the dry matter of the silages. The pH of the silages 1 and 4 weeks after ensiling was (1) 6.00, 5.83; (2) 5.00, 4.56; (3) 4.96, 4.80; and (4) 4.92, 4.78. Total faecal and urine collection trials were conducted using 12 Holstein steers having an average body weight of 200 kg. Dry matter digestibility was greater for silages 2, 3 and 4. Digestible energy and protein were 61.2, 70.6; 65.3, 74.6; 65.2, 71.2; and 68.2, 76.4% for silages 1 through 4.

1147 DEGANI, G., LEVANON, D., and VISEL, A. 1983. Preliminary study on selection of food by levant vole Microtusguentheri (Dansford et Alston, 1982) from alfalfa field. Biology of Behaviour 8(2): 97-102. 10 ref.

The levant voles tested in the laboratory showed a strong preference for alfalfa (63%) over other kinds of food (apples, wheat, germinated wheat, sorghum, cucumber, barley, carrot and concentrated cattle feed).

1148 EL HAG, G.A., and GEORGE, A.E. 1983. Potential of agroindustrial by-products as feed for ruminants in the Sudan. Pages 16-22 In By-product utilization for animal production (Kiflewahid, B., Potts, G.R., and Drysdale, R.M., eds.). Ottawa, Canada: IDRC. 8 ref. (Summaries:Es, Fr).

The by-products of sorghum straw, groundnut hulls and sugarcane bagasse were each fed to bulls along with feed supplements. The DM intake and liveweight gain showed no significant differences amongst the rations. In digestibility trials with sheep DM digestibility was highest in sorghum.

1149 FERNANDEZ MEJIA, J.G. 1983. Quantification of tannins in samples of sorghum (Sorghum vulgare) from various states of the Mexican Republic. (Es). Thesis, Universidad Nacional Autonoma de Mexico, Mexico. 64 pp. 24 ref.

1150 GOMEZ, G., and VALDIVIESO, M. 1983. Cassava meal

for baby pig feeding. Nutrition Reports International 28(3): 547-558.

A comparison of cassava- and sorghum-based diets for baby pigs and lactating sows by the single feed method was evaluated. There was no significant difference between the cassava- and sorghum-based diets when they were compared by the single feed method.

1151 GOMEZ, G., VALDIVIESO, M., SANTOS, J., and HOYOS, C. 1983. Evaluation of cassava root meal prepared from low-or high-cyanide containing cultivars in pig and broiler diets. Nutrition Reports International 28(4): 693-704. 26 ref.

Results of feeding trials with pigs and broilers indicated that cassava root meal of both the low- and high-cyanide containing cultivars was satisfactorily used by these species and animal performance was similar to those fed sorghum-based diets.

1152 GONZALEZ, J. 1983. Quantifying the food wasted by the broiler [sorghum]. (Es). Thesis, Universidad Nacional Autonoma de Mexico, Mexico. 14 pp. 7 ref.

1153 HALE, O.M. 1983. Lightweight grain sorghum versus corn for growing-finishing swine. Research Report, Georgia Agricultural Experiment Stations 434: 1-7.

1154 HANEY, R.L. 1983. Sorghum silage boosts beef cattle gains. Dairy and Food Sanitation 3(9): 335-336.

1155 HARDIN, D.R., and RANDEL, R.D. 1983. Effect of monensin on post partum interval to 1st estrus and serum luteinizing hormone response to 0 1 2 or 4 milligrams Estradiol 17-beta at 21 days post partum. Theriogenology 19(3): 343-354.

1156 HATHCOCK,B.R., and CULVAHOUSE, E.W. 1983. Digestibility of corn, non-bird resistant and bird resistant sorghum grain. Tennessee Farm and Home Science 125: 29-30. 8 ref.

In vivo dry matter digestibility of grain from non-bird resistant and bird resistant sorghum are estimated and these estimates are compared with the digestibility of yellow corn.

1157 HENNESSY, D.W., WILLIAMSON, P.J., NOLAN, J.V., KEMPTON, T.J., and LENG, R.A. 1983. The roles of energy- or protein-rich supplements in the subtropics for young cattle consuming basal diets that are low in digestible energy and protein. Journal of Agricultural Science (UK) 100(3): 657-666. 35 ref.

Supplementing the basal diet of hay with high energy sorghum did not improve the feed efficiency and live weight of steers. Sorghum grain depressed forage intake and did not improve rumen fermentation in steers.

1158 HIBBERD, C.A., WAGNER, D.G., HINTZ, R.L., and GRIFFIN, D.D. 1983. Effect of sorghum grain variety and processing method on the site and extent of starch digestion in steers. Pages 28-33 In 1983 animal science research report. Stillwater, Oklahoma, USA: Oklahoma State University.

1159 HIBBERD, C.A., WAGNER, D.G., HINTZ, R.L., and WEIBEL, D.E. 1983. Effect of stage of maturity on the chemical composition and in vitro digestibility of sorghum grain. Pages 21-27 In 1983 animal science research report. Stillwater, Oklahoma, USA: Oklahoma State

University.

1160 HORIGOME, T., and UCHIDA, S. 1983. Nutritional quality of leaf proteins prepared from crops [sorghum] containing phenolic compounds and polyphenolase. Pages 362-364 In Proceedings of the Sixteenth International Grassland Congress, 15-24 June 1981, Lexington, Kentucky, USA (Smith, J.A., and Hays, V.W., eds.). Boulder, Colorado, USA: Westview Press.

1161 ICHIKAWA, A., TAMADA, S., and TAKAHASHI, T. 1983. Effects of abundant supply of corn and milo to pigs on their growth, carcass traits and meat quality. (Ja). Research Bulletin of the Aichi-Ken Agricultural Research Center 15: 397-402. 9 ref. (Summary:En).

1162 JAKHMOLA, R.C., and PATHAK, N.N. 1983. Feeding value of Banchari (Sorghum halepense) and Kumaria (Andropogon contortus) grasses for sheep. Indian Journal of Animal Sciences 53(7): 787-788.

1163 JORDE, D.G., KRAPU, G.L., and CRAWFORD, R.D. 1983. Feeding ecology of mallards (Anas platyrhynchos) wintering in Nebraska, USA. Journal of Wildlife Management 47(4): 1044-1053.

1164 KIRBY, L.K., NELSON, T.S., JOHNSON, Z.B., and YORK, J.O. 1983. The effect of seed coat color of hybrid sorghum grain on the ability of chicks to digest dry matter and amino acids and to utilize energy. Nutrition Reports International 27(4): 831-836. 7 ref.

Six samples each of sorghum grains with brown and with yellow seed coats, based on the bleach test, were selected for testing. Each sample was fed to 24 4-week-old chicks for 4 hours and total fecal excretion was collected 24 hours later. Feed and feces were analyzed for their amino acids, dry matter, and gross energy (GO) content. Highly significant ($P<.01$) correlations were obtained for color vs metabolizable energy, dry matter digestion and energy utilization and for dry matter digestion vs energy utilization. Negative correlations ($P<.01$) were obtained when tannin was compared to metabolizable energy, per cent of gross energy metabolized, dry matter digestion, color and amino acid digestion.

1165 KLOPFENSTEIN, C.F., HOSENEY, R.C., and VARRIANO-MARSTON, E. 1983. Effects of ascorbic acid in sorghum-, high leucine-, and casein-fed guinea pigs. Nutrition Reports International 27(1): 121-129. 33 ref.

Guinea pigs fed sorghum-, high-leucine-casein-, or casein-based diets supplemented with 50 mg ascorbic acid (AA) grew slower than those receiving 3 mg AA/day. When the 50 mg AA supplementation was discontinued for 10 days, there was no evidence of accelerated AA depletion. Instead, high AA supplementation seemed to have a protective effect against AA depletion in sorghum- and high-leucine-casein-fed animals. Cholesterol levels were lower in guinea pigs fed the 50 mg AA than in those fed the 3 mg AA supplemented sorghum and high-leucine-casein diets. High AA levels also resulted in lower serum copper while serum zinc concentration was not affected.

1166 KONDOS, A.C., and FOALE, M.A. 1983. Comparison of the nutritional value of low and medium tannin sorghum grains for pigs. Animal Feed Science and Technology 8(2): 85-90. 21 ref.

The effect of sorghum grain of low (0.32%) and medium (0.94%) tannic acid content was studied in a growth experiment on large white pigs. Medium tannin sorghum in pig diets had no significant adverse effect on growth, back fat thickness or feed conversion efficiency, but it was associated with a trend towards lower growth rate. All-sorghum diets, with either low or medium tannin, resulted in a significantly inferior feed conversion ratio compared to the wheat control. It was concluded that sorghum grain with up to about 0.94% tannic acid can be used as the main or sole grain in grower pig diets without the risk of any significant adverse effect on growth or back fat thickness.

1167 KUBENA, L.F., PHILLIPS, T.D., CREGER, C.R., WITZEL, D.A., and HEIDELBAUGH, N.D. 1983. Toxicity of ochratoxin A and tannic acid to growing chicks. Poultry Science 62(9): 1786-1792. 24 ref.

Seven grain sorghum varieties with high tannin content were used in experimental poultry diets with the addition of tannic acid and ochratoxin. Poor weight gain, decreased pigmentation and poor feed efficiency were noticed in chicks due to the combination of high tannin and ochratoxin in the diet.

1168 LIN, F.D.T. 1983. Digestibilities of amino acids, nitrogen, energy and starch in corn, sorghum, wheat, barley, oat groats and wheat middlings in growing swine at the end of the small intestine and over the total digestive tract. Ph.D. thesis, Texas A & M University, College Station, Texas, USA. 79 pp.

1169 MASAOKA, Y., and TARUMOTO, I. 1983. Influence of cellulase concentrations and incubation periods on in vitro dry matter digestibility value determinations for unground dried sorghum leaves. (Ja). Journal of Japanese Society of Grassland Science 29(3): 251-254. (Summary:En).

1170 MEHANSHO, H., HAGERMAN, A., CLEMENTS, S., BUTLER, L., ROGLER, J., and CARLSON, D.M. 1983. Modulation of proline-rich protein biosynthesis in rat parotid glands by sorghums with high tannin levels. Proceedings of the National Academy of Sciences of the United States of America 80(13): 3948-3952. 33 ref.

Feeding of high-tannin sorghum to rats caused changes in gene expression in parotid glands. Within 3 days the parotid glands were enlarged about 3-fold and a series of proline-rich proteins were increased about 12-fold. Unlike isoproterenol treatment, no changes were observed in the submandibular glands, and a Mr 220,000 glycoprotein in parotid glands was not induced. Amino acid analyses, electrophoretic patterns, and cell-free translations of mRNAs all confirmed that the proline-rich proteins induced by feeding high-tannin sorghum were identical to those induced by isoproterenol treatment. Binding curves for proline-rich proteins to tannins showed affinities 10-fold greater than bovine serum albumin and tannins.

1171 MERENYI, T. 1983. Feeding of sorghum [Sorghum arundinaceum] to beef cattle [Hungary]. Taurina Hirado (Hungary) 12(1): 9-13.

1172 MIAKI, T., KUDO, I., TANAKA, S., and KAWAMURA, O. 1983. Studies on the improvement in utilization of sorghum silages. 4. Comparative nutritive value of several forage sorghum hybrids

harvested as a green crop. (Ja). Bulletin of the Faculty of Agriculture, Miyazaki University 30(2): 111-122. 14 ref. (Summary:En).

Five sorghum hybrids including sudangrass x sorghum hybrids were harvested at 3 stages of maturity and analysed for nutritive value in Japan. The hybrids differed in their crude protein content, crude fibre content, digestibility, palatability and lignin content at the 3 stages of maturity.

1173 MIAKI, T., KUDO, I., TANAKA, S., and KAWAMURA, O. 1983. Studies on the improvement in utilization of sorghum silages. 5. Comparative nutritive value of several forage sorghum hybrids harvested as silage. (Ja). Bulletin of the Faculty of Agriculture, Miyazaki University 30(2): 123-130. 15 ref. (Summary:En).

Five sorghum hybrids including sudangrass x sorghum hybrids were harvested at dough-ripe stage in Japan. The silage was prepared and analysed for digestibility in goats.

1174 MICHELENA, J., LY, J., and PEREIRO, M. 1983. Evaluation of dehydrated citrus pulp as a substitute for grain sorghum in diets for ruminants. Cuban Journal of Agricultural Science 17(1): 33-39. 21 ref. (Summary:Ru).

The composition, DM digestibility and percentage of N retention of sorghum meal, citrus pulp meal, torula yeast and fish meal diets fed to Holstein calves are compared.

1175 MITARU, B.N., REICHERT, R.D., and BLAIR, R. 1983. Anaerobic storage of moist grain and boiling treatments of sorghums - their effects on tannin content and nutritive value for rats and chickens. Pages 80-81 In Human nutrition (McLoughlin, J.V., and McKenna, B.M., eds.). Dublin, Ireland: Boole Press.

1176 MITARU, B.N., REICHERT, R.D., and BLAIR, R. 1983. Improvement of the nutritive value of high tannin sorghums for broiler chickens by high moisture storage (reconstitution). Poultry Science 62(10): 2065-2072. 36 ref.

Reconstitution of high tannin sorghums with water increased protein digestibility by 6 to 16 percentage units and dietary metabolizable energy content by 0.1 to 0.3 kcal/g for broiler chickens. There was a significant cv. effect on leg scores, but the correlation between dietary tannin content and leg scores was low. The improvement in weight gains, feed efficiencies and protein digestibilities at 10 and 20 days of storage was not different, indicating that the benefits of high-moisture storage were already obtained by 10 days.

1177 MODRAN, T., and ILIESCU, N. 1983. An episode of cyandric intoxication of vegetal nature, due to the Sorghum halepense ingestion, in particular weather conditions (in young cattle). (Ro). Revista de Cresterea Animalelor 6: 39-40. 4 ref.

1178 MOON, N.J., and ELY, L.O. 1983. Addition of Lactobacillus sp. to aid the fermentation of alfalfa, corn, sorghum, and wheat forages. Pages 634-636 In Proceedings of the Fourteenth International Grassland Congress, 15-24 June 1981, Lexington, Kentucky, USA (Smith, J.A., and Hays, V.W., eds.). Boulder, Colorado, USA: Westview Press. 5 ref.

The silages differed in their rate and extent of fermentation,

microflora, and recovery of nutrients. Corn and sorghum silages had high recovery of nutrients, while alfalfa and wheat fermentations were intermediate. Study of natural microflora of fresh forages indicated few (100000/g) lactic acid bacteria are present in wheat, but higher numbers were recovered from alfalfa (1000000/g) and corn or sorghum (10000000/g) silages. Higher populations of lactic acid bacteria ensured faster acid production and pH decline in control silages. Addition of L. acidophilus and Candida sp. had no effect on the fermentation. Addition of L. plantarum caused increases in populations of lactobacilli during the fermentation and more rapid pH declines but only slight differences in recovery of nutrients.

1179 MOSIENYANE, B.P. 1983. Crop residues for animal feeding. Bulletin of Agricultural Research in Botswana 1: 3-9. 5 ref.

Crop residues of sorghum, millet and maize from experimental farms of Botswana were sampled after grain harvesting during April to June, 1979. It was revealed that the crop residues when harvested timely and stored, could be of considerable value as a maintenance feed during winter. DMD in-vitro for any residue harvested during April was higher than 58% and thus well above the critical level for maintenance. Later harvesting (during June and July) resulted in both quantitative loss and decrease in nutritive value (DMD of some 52%).

1180 MYER, R.O., GORBET, D.W., and WHITE, C.E. 1983. Bird-resistant grain sorghum in swine diets. Sorghum Newsletter 26: 100-101.

Pigs fed diets containing bird resistant sorghum (BRS) were found to have an average daily rate of weight gain similar to that of pigs fed corn diets indicating that BRS is highly acceptable to the growing pig. However, inclusion of BRS in the diet resulted in poorer feed efficiency. Pigs fed the BRS diets utilized feed 87% as efficiently as those fed the corn diets over the 4 experiments conducted.

1181 NANDRA, K.S., GUPTA, B.K., and CHOPRA, A.K. 1983. The effect of stage of maturity on the digestion of hemicelluloses of sorghum (Sorghum bicolor). Journal of the Science of Food and Agriculture 34(9): 962-964.

The sugar composition of hemicelluloses before and after in vitro digestion of sorghum at different stages of maturity was determined. Xylose was the main monosaccharide residue and its content increased with maturity. It was also the least digestible sugar residue. Galactose and arabinose residues were highly digestible at all stages of maturity.

1182 NISHIKAWA, A. 1983. Studies on whole-crop-silage of grain sorghum: silage making and quality materials for whole-crop-silage. (Ja). Bulletin of the Mie Agricultural Technical Center 12: 55-60. 8 ref.

1183 ODUYE, O.O., HEAD, K.W., SMITH, J.A., and BABATUNDE, G.M. 1983. Suspected aflatoxin B1-induced liver cirrhosis in pigs in Ibadan, Nigeria. Tropical Veterinaria 1(1): 18-24. 21 ref.

Cirrhotic changes in the livers of 6-month-old weaner pigs in the University of Ibadan commercial piggery are described. These changes are attributed to high levels of aflatoxin B1 demonstrated in their meal. While groundnut cake is considered the most likely

source of aflatoxin, it is also suggested that under bad storage conditions, cereals, including yellow maize or guinea corn, could contribute to the toxic effect of the feed.

1184 PATHAK, J.N., and PAL, R.N. 1983. Effect of chopping green forage on milk production and composition in murrah buffaloes. II. Kharif fodder (sorghum). Haryana Agricultural University Journal of Research 13(3): 362-365. 8 ref.

The average DM intake was 2.69, 2.62 and 2.70 kg per 100 kg body weight with DM digestibility coefficients of 55.8, 54.3 and 53.5 in 5, 2.5 and 1 cm cut sorghum, respectively. The digestibility for CP was 55.6, 57.4 and 53.4; for EE 60.6, 56.7 and 62.8; for CF 56.3, 60.5 and 56.5; and for NFE 63.5, 62.3 and 62.8, respectively. Intake of DCP and TDN was similar in all the 3 treatments. Slightly more milk production was obtained on feeding sorghum cut into 1 cm bits to milch buffaloes. The results also showed that a slight deficiency of DCP in 5 and 1 cm sized bits did not affect the weight of animal in any way.

1185 PEDERSEN, B., and EGGUM, B.O. 1983. Influence of milling on the nutritive value of flour from cereal grains. 6. Sorghum. Qualitas Plantarum Plant Foods for Human Nutrition 33(4): 313-326. 36 ref.

Low-tannin sorghum was milled into flour with extraction rates between 100 and 64%. The nutritive value of the flours was studied by chemical analyses and in balance experiments with growing rats. The effects of amino acid supplementation was also examined. In general, the content of essential nutrients decreased when the extraction rate was lowered, but the content of fibre, tannins and phytate was also significantly reduced by milling. The digestibility of energy as well as protein was high, but the protein quality was poor, especially in flours of low extraction. Amino acid supplementation improved protein utilization and weight gain considerably. Femur zinc concentration was significantly depressed in the rats fed the amino acid supplemented diets, and sorghum was a poor source of available zinc, when highly refined. The poor zinc availability was attributed to the high content of phytate.

1186 PEDERSEN, E., and EGGUM, B.O. 1983. The effect of milling yield on the nutritional value of flour [for rats]. 6. Sorghum. (Da). Meddelelse, Statens Husdyrbrugsforsoeg 512: 1-4.

1187 PEREZ ORTEGA, G.A. 1983. Sorghum silage with concentrates and supplementary feeding for growing heifers. (Es). Thesis, Universidad Central de Venezuela, Maracay, Venezuela. 32 pp.

1188 PLONKA, S., PASCHMA, J., OKONSKI, J., and KOLAT, S. 1983. Sorghum as a replacer of barley and maize in pig fattening. (Pl). Roczniki Naukowe Zootechniki 10(1): 145-159. 15 ref. (Summaries:De, Ru).

1189 POLLMANN, D.S., BEHNKE, K.C., and ALLEE, G.L. 1983. The effect of diet complexity and physical form on the performance of starter pigs and feed processing efficiency. Animal Feed Science and Technology 8(2): 99-106. 18 ref.

A simple diet of sorghum-soybean meal was compared with a complex diet containing 3% tallow and 5% dried whey. Pigs performed similarly and the cost of gain was

found to be less on a simple diet in meal form than on a complex diet in pellets or crumbles.

1190 QUILFEN, J.P., and MILLEVILLE, P. 1983. Crop residues and animal manure: an aspect of agriculture-animal husbandry relations in the north of Upper Volta. (Fr). Agronomie Tropicale 38(3): 206-212. 11 ref.

The interrelationships between sorghum and millet production and animal production, the intake of residues and addition of manure to the land were studied. The stock rearing and upland agriculture were found to be complementary.

1191 RIVERO ERHART, R.E.A. 1983. Comparison of sorghum (Sorghum bicolor) and elephant (grass) forage (Pennisetum purpureum) in dairy cows feeding. (Es). Thesis, Universidad Central de Venezuela, Maracay, Venezuela. 54 pp.

1192 ROBERSON, R.H. 1983. Sunflower meal as a replacement for soybean meal in milo or wheat diets. Poultry Science 62(7): 1489. (Abstract).

Wheat or milo were used with three different combinations of soybean meal and sunflower meal in a 2 x 3 factorial arrangement of 6 treatments. Each of the 8 dietary treatments was given to 18 pullets in 6 replications of 3 pullets for 1 yr. Egg production was not affected by the grain source in the diet. Egg mass and egg weight were lower but kg feed/kg egg was higher for pullets on the wheat diets than for pullets on the milo diets.

1193 RODRIGUEZ, H.R., ELKIN, R.G., and ROGLER, J.C. 1983. Effects of increasing dietary nitrogen as intact protein vs Crystalline amino acids on the antinutritional properties of sorghum tannins. Poultry Science 62(7): 1490. (Abstract).

Two experiments were conducted with broiler chicks to investigate the effects of feeding high tannin and low tannin sorghum in diets supplemented with either isolated soy protein (ISP) or crystalline amino acids (CAA) at two levels of nitrogen. CAA were added in the same amounts as provided by the ISP. For all diets, the level of sorghum protein was held constant, while the amount of non-sorghum nitrogen added in the higher nitrogen diet was double that of the lower nitrogen diet. HTS depressed growth rate at both nitrogen levels with the CAA diet, although doubling the CAA improved growth with both sorghums. It was observed that increasing intact protein, but not CAA, alleviated the antinutritional qualities of HTS. A major effect of additional protein involves a complexing with free tannin which prevents its action in some other toxic mechanism.

1194 ROMERO, M., BRITO, C., and DIXON, R. 1983. Effects of supplementation with ground sorghum, maize flour or molasses on digestibility and fermentation in the rumen of sheep fed Pennisetum purpureum. (Es). Pages 26-27 In Informe anual 1982. Maracay, Venezuela: Universidad Central de Venezuela, Instituto de Produccion Animal.

Total DM intake and digestibility increased with supplementation of ground sorghum + 1% urea in 5 sheep fed chopped elephant grass.

1195 ROSSI, M.J., and RODRIGUEZ MARIANI, F. 1983. Effects of the supply of a soluble mineral nucleus and zeranol implants on the weight gain of steers under sorghum grazing. (Es). Thesis, Universidad Nacional de Mar del Plata,

Balcarce, Argentina. 89 pp. 51 ref.

1196 SAID, A.N., WHEELER, J.L., and HEDGES, D.A. 1983. Sulfur supplementation of Hereford x Boran steers grazing Sorghum almum. Tropical Animal Production 8(1): 53-55. 8 ref.

Two groups of cattle were made to graze on Sorghum almum with sulphur 0.11 to 1.8% for 10 months. Weight gain by those given a salt lick with 8% sulphur did not differ significantly from that of controls given salt alone.

1197 SARANI, S., KOVAK, K., TEETER, R.G., and HIBBERD, C.A. 1983. Feeding value of reconstituted high-tannin sorghum in a practical ration in a chick trial. Pages 255-257 In 1983 animal science research report. Stillwater, Oklahoma, USA: Oklahoma State University, Animal Science Department.

1198 SCHROEDER, G.L. 1983. Stable isotope ratios as naturally occurring tracers in the aquaculture food web. Aquaculture 30(1-4): 203-210. 16 ref.

The plant matter metabolism of sorghum, a feed component, is studied to measure the isotopic ratio of the body of the fish.

1199 SELL, D.R., and ROGLER, J.C. 1983. Effects of sorghum grain tannins and dietary protein on the activity of liver UDP-glucuronyltransferase. Proceedings of the Society for Experimental Biology and Medicine 174(1): 93-101. 37 ref.

The activity of liver microsomal UDP-glucuronyltransferase (EC 2.4.1.17), was measured in chicks and rats fed high- (HTS) and low-tannin sorghums (LTS). In an initial investigation, activity was significantly elevated in chicks fed HTS-soybean meal diets over those fed the LTS control diet. Other studies were designed to differentiate between the effects due to tannin and those resulting from a protein deficiency which had previously been reported to increase the activity of this enzyme. In general, only a relatively small part of the increased activity observed by feeding HTS to chicks could be attributed to a tannin-induced protein deficiency. The same phenomenon of elevated activity produced by feeding HTS to chicks was not observed in the rat. These results suggest that sorghum tannins, or their breakdown products, are absorbed and activating UDP-glucuronyltransferase in the chick, but not in the rat.

1200 SELL, D.R., ROGLER, J.C., and FEATHERSTON, W.R. 1983. The effects of sorghum tannin and protein level on the performance of laying hens maintained in two temperature environments. Poultry Science 62(12): 2420-2428. 51 ref.

A total of 144 White Leghorn hens were arrayed according to egg production during a 10-day preexperimental period into 8 groups consisting of 4 nutritional treatments in each of 2 constant temperature environments. The nutritional treatments consisted of low (RS610) and high (Savanna) tannin sorghum grains compared isonitrogenously within a protein level at 2 protein levels in sorghum-soybean meal diets. Tannin significantly reduced egg production and feed efficiency at both protein levels while egg specific gravity and shell thickness were adversely affected only at the lower level of protein. Egg weight and weight loss of hens were not affected by tannin. Except for weight loss all parameters were slightly reduced by

the higher temperature.

1201 SINGH, A.P., and PANDITA, N.N. 1983. Studies on fermentation of sorghum silage during storage, and its effect on milch animals. Animal Feed Science and Technology 9(2): 143-148. 11 ref.

Three silages: sorghum alone (T1); sorghum + 0.5% urea (T2); and sorghum + wheat straw in the ratio of 4:1 (T3), were assessed for their biochemical products and stability. The performance of milch cattle maintained on these forage diets was compared with wheat straw as a control (T4). Animals of all four groups were given sufficient concentrate to satisfy their nutrient requirements. On the basis of fermentation products all three silages were classed as 'good' to 'very good'. The palatability of these silages was relatively better than that of the control (T4). Milk production appeared to be better with non-urea silages.

1202 SINGH, K., and GUPTA, P.C. 1983. Effect of replacing concentrates by sorghum-cowpea silage on milk production in murrah buffaloes. Indian Journal of Dairy Science 36(3): 318-321. 13 ref.

The study was conducted in Haryana, India on 12 lactating murrah buffaloes. The feeding of sorghum-cowpea silage did not affect the milk production and its composition and brought down the cost of milk production considerably.

1203 SINGH, K., and GUPTA, P.C. 1983. Feasibility of utilizing urea treated sorghum silage and cowpea wheat bhusa silage for growth in crossbred calves. Indian Journal of Dairy Science 36(3): 321-324. 8 ref.

The study revealed that the growing of cross-bred calves fed on cowpea-wheat bhusa silage with 1 kg of concentrate mixture supported growth rate of about 358 g per day, while the silage prepared from sorghum urea with 1 kg concentrate mixture could support only 270 g per day.

1204 SINHA, R.N., and RANGANATHAN, B. 1983. Cellulolytic bacteria in buffalo rumen. Journal of Applied Bacteriology 54(1): 1-6. 28 ref.

The influence of 3 different feeds, wheat straw, sorghum and berseem, on total and cellulolytic bacterial counts in the buffalo rumen at different time intervals from 0 to 8 h after feeding was studied. Cellulolytic cocci were present in smaller numbers than rod forms in the rumen of wheat-straw-fed buffaloes, whereas the cocci outnumbered rod forms in sorghum- and berseem-fed buffaloes.

1205 SOSA RUIZ, N.R. 1983. Effect of sorghum (Sorghum bicolor) silage supplemented with sorghum meal on heifers growing. (Es). Thesis, Universidad Central de Venezuela, Maracay, Venezuela. 37 pp. 23 ref.

1206 SOSA, N., and COMBELLAS, J. 1983. Effect of level of supplementation of sorghum silage with sorghum meal on growth of heifers. (Es). Pages 78-79 In Informe anual 1982. Maracay, Venezuela: Universidad Central de Venezuela, Instituto de Produccion Animal.

1207 STALLCUP, O.T., KREIDER, D.L., BROWN, C.J., YORK, J.O., and HARRISON, K.L. 1983. Nutritive value of locally grown forages. Special Report, Arkansas Agricultural Experiment Station 113: 94-129. 45 ref.

The composition and nutritive value of forages including sorghum were studied in digestion and metabolism trials at Arkansas, USA. Ammonia treatment increased the digestibility of the dry matter and the fibrous fractions of sorghum hay in cattle.

1208 SWEETEN, J.M., ETHEREDGE, R.S., LAWHON, J.T., and EGG, R.P. 1983. Stillage processing for nutrient recovery [from grain sorghum]. Paper, American Society of Agricultural Engineers no. 83-3059.

1209 SWEETEN, J.M., LAWHON, J.T., SCHELLING, G.T., and ETHEREDGE, R.S. 1983. Grain sorghum stillage processing: nutrient recovery and pollution control. Transactions of the ASAE 26(4): 1158-1165, 1170. 18 ref.

Grain sorghum stillage from a farm-scale fuel alcohol plant was separated into wet solids and liquid fractions by various processes. Dry matter recovery averaged 42% with a screw press, 21 and 34% with two centrifuges, 98% with a reverse osmosis unit, and 19% with ultrafiltration. More than 99% of the nitrogen (protein) was recovered with three stages of treatment. Resulting wastewater still had a chemical oxygen demand of 4100-9400 ppm and required biological treatment or land application.

1210 SWEETEN, J.M., LAWHON, J.T., SCHELLING, G.T., GILLESPIE, T.R., and COBLE, C.G. 1983. Removal and utilization of ethanol stillage constituents. Energy in Agriculture 1(4): 331-345. 14 ref.

A farm-scale ethyl alcohol plant was used to produce whole stillage from ethanol production using corn and grain sorghum as feedstocks. The stillage was separated into wet pressed solids and thin stillage liquids fractions using a commercial dewatering screw press. Thin stillage liquids from several batches were processed further by centrifugation. The wet pressed solids fraction was highly palatable to cattle but spoiled rapidly. Fermentation of corn and grain sorghum for ethanol production improved the amino acid content and protein quality of fermentation products. The dry matter digestibility of the wet pressed solids fraction from grain sorghum stillage was determined from cattle feeding trials to be 76.9%.

1211 TAKEDA, I., SAWADA, T., and HIOAKA, M. 1983. The effect of plant type on feeding value (for sheep) of forage sorghum silage. (Ja). Kyushu Agricultural Research 45: 139.

1212 TRIBBLE, L.P. 1983. Grain sorghum in swine rations [nutritive value]. Pages 1-7 In 2. Conferencia Nacional de Produccion Animal, 23-24 June 1983, San Jose, Costa Rica. San Jose, Costa Rica: Asociacion Costarricense de Zootecnistas.

1213 UPADHYAY, V.S., VERMA, N.C., and MAJUMDAR, A.B. 1983. Quality of mixed forage silages and their effect on milk production. Indian Journal of Animal Sciences 53(10): 1162-1163. 4 ref.

The chemical composition of silages prepared from cowpea + sorghum and oats + berseem, their digestibility and effect on milk production in cows are studied.

1214 VAN DER MERWE, H.J., PIENAAR, A., VERMAAK, L.M., and VAN RENSBURG, L.J.J. 1983. A comparison between maize and grain sorghum as a concentrate source in fattening diets for beef cattle. (Af). South African Journal of Animal Science 13(2): 102-106. 18

ref. (Summary:En).

The replacement of maize meal with both bird resistant and non-bird resistant types of grain sorghum in the diet of steers resulted in a highly significantly lower apparent digestibility of both dry matter and gross energy. A significant and highly significant decrease in apparent digestibility of protein occurred when maize meal was replaced with either non-bird resistant or bird resistant grain sorghum, respectively. A higher dry matter intake by steers on the grain sorghum diets resulted in some compensation for the lower digestibility. Nevertheless, an 11% and 50% reduction in efficiency of feed conversion to carcass mass of steers was observed when maize meal was totally replaced by non-bird resistant or bird resistant grain sorghum, respectively. From the results it was concluded that for the successful use of bird resistant grain sorghum in finishing diets for cattle the digestible protein content of the diet should be corrected.

1215 VECCHIETTINI, M. 1983. A livestock utilization hypothesis. (It). Informatore Agrario 39(13): 25225-25228. 6 ref.

The feeding of cattle with sorghum stover + sugarbeet pulp is discussed.

1216 VIOLA, S., and ARIELI, Y. 1983. Evaluation of different grains as basic ingredients in complete feeds for carp and tilapia in intensive culture. Bamidgeh 35(2): 38-43. 3 ref.

Corn, sorghum, wheat, wheat bran and barley were compared in four cage-trials as basic ingredients in feeds for carp and tilapia of 120-250 g. All test diets contained 25% crude protein. With tilapia, sorghum or bran mixed with corn gave the best results, while corn alone reduced the rate of growth significantly in each trial. The differences in feed utilization between the two species and their implications for commercial feed formulation are discussed.

Food Products

1217 ALI, M.R. 1983. Evaluation of sorghum for use as human food. Ph.D. thesis, University of New South Wales, Kensington, New South Wales, Australia.

A range of hybrid cv. and pure lines of diverse grain colour, type and texture were studied for appearance, morphological composition, milling characteristics and suitability for use as a boiled whole grain. There was considerable variation in grain appearance, grain size and morphological composition of the cv. The yield of unbroken kernels varied from 72.5 to 90.7% when the grain was milled to 10% decortication. The black hilar remained in all grain during dehulling. Grain that was weather-damaged had reduced yield of unbroken kernel and did not scour satisfactorily. The cooking time varied from 51 to 73 min in nonwaxy cv. and 45 min the waxy cv. Twelve selected cv. were dehulled for 3-45% milling loss and the milling yield and cooking times of the fractions estimated. The breakage of the grain increased markedly after removal of peripheral endosperm. The major decrease in cooking time occurred during removal of pericarp. Soaking milled grain in water reduced the cooking time. Treatments with various alkaline

compounds decreased the cooking time of nonwaxy grain to about 24 min.

1218 BEDOLLA, S. 1983. Development and characterization of an instant tortilla flour from sorghum and maize by infrared cooking (micronizing) and extrusion cooking. Ph.D. thesis, Texas A & M University, College Station, Texas, USA. 126 pp.

Micronized sorghum flours were whiter, had higher water absorption indices, had better aroma, and the masas were more cohesive than those from extruded flours.

1219 BEDOLLA, S., PALACIOS, M.G. DE, ROONEY, L.W., DIEHL, K.C., and KHAN, M.N. 1983. Cooking characteristics of sorghum and corn for tortilla preparation by several cooking methods. Cereal Chemistry 60(4): 263-268. 17 ref.

Various methods of cooking affected the total dry matter lost during the processing of corn and sorghum in tortillas. However, within a cooking method, the total dry matter losses were the same for sorghum and corn when each grain was cooked for its optimum time. Unpearled and pearled sorghum required only one third and one sixth the cooking time of corn, respectively. The chemical composition of grain, nixtamal, masa, and tortillas made from unpearled white sorghum or white corn was similar, except that the corn products had more ether extract. The greenish yellow colour of sorghum tortillas disappeared when 13% of the initial kernel weight was removed by pearling. For pearled sorghums, the cooking time and the alkali concentration were reduced considerably to control the stickiness of masa. Several procedures to prevent stickiness of masa are suggested.

1220 BREYER, L.M., and WALKER, C.E. 1983. Comparative effects of various sucrose-fatty acid esters upon bread and cookies. Journal of Food Science 48(3): 955-958, 987.

Standardized bread and cookies were baked to test the effects of sucrose fatty-acid esters, ranging in HLB (hydrophyl-lipophyl-balance) from 1 to 15. Bread volume and tenderness and cookie spread were determined. Interactions between shortening and the esters were tested in bread, and between nonwheat flours and the esters in both bread and cookies. Bread volume was restored when up to 20% sorghum, millet and corn flours were added. Bread tenderness over a five-day period was also improved by use of the esters. The most practical emulsifier use levels ranged from 0.5-1.0%, depending upon emulsifier HLB.

1221 CHANDRASHEKAR, A., and DESIKACHAR, H.S.R. 1983. Sorghum quality studies. Part 1. Rolling quality of sorghum dough in relation to some physicochemical properties. Journal of Food Science and Technology (India) 20(6): 281-284. 11 ref.

Roti rolling quality of 45 varieties of sorghum in relation to the physicochemical characteristics of flours was studied. Varieties possessing good rolling quality showed lower gelatinization temperature, higher peak viscosities, and higher set backs in the Brabender viscograph. Higher water uptake at 70 deg C was correlated to starch damage in flour. Amylose, protein and prolamine content of flour had no relation to roti rolling quality.

1222 DADA, L.O., and MULLER, H.G. 1983. The fate of aflatoxin B, in the production of

Ogi, a Nigerian fermented sorghum porridge. Journal of Cereal Science 1(1): 63-70. 29 ref.

Nigerian sorghum was inoculated with spores of Aspergillus flavus and incubated until mold growth was observed. The grain was then ground and sieved. The meal, containing 2333 micro g/kg of aflatoxin B1, was then mixed with uncontaminated material to give two samples containing 200 and 800 micro g/kg of aflatoxin. In another set of experiments different levels of pure aflatoxin B1 were used to treat the grain. All samples were then processed into ogi. With fungal contamination, 33% of the aflatoxin was found in the ogi after processing. With the grain contaminated with pure aflatoxin, 26% was recovered. In both instances traces of the less toxic aflatoxin B2a were found. The addition of boiling water to the ogi to produce the porridge resulted in a further aflatoxin loss of about 3%.

1223 DEWALT, K.M., and THOMPSON, K.S. 1983. Sorghum and nutritional strategies in southern Honduras. Practicing Anthropology 5(3): 15-16.

As a part of INTSORMIL's goal of the improvement of the sorghum production, the nutritional systems of southern Honduras and the place of sorghum in them, the local beliefs about the appropriateness and acceptability of sorghum as human food and the anticipation of increase in sorghum production are studied.

1224 EBELER, S.E., and WALKER, C.E. 1983. Wheat and composite flour chapaties: effects of soy flour and sucrose-ester emulsifiers. Cereal Chemistry 60(4): 270-275. 15 ref.

A simple laboratory method was developed to measure the effect of the addition of soy flour and emulsifiers upon chapaties baked from wheat, sorghum, pearl and proso millets, corn, and soy flours obtained from commercial sources. Various flours and their blends were judged subjectively for dough handling and puffing characteristics, and chapati colour was determined with a Hunter colour difference meter. The Instron testing machine was used to measure tenderness. A simple response surface methodology technique was used to interpret experimental results. Visual scores and Instron shear-force values decreased approximately linearly with per cent nonwheat flour. Sucrose-ester emulsifiers did not improve dough-handling characteristics or tenderness of the finished product.

1225 EGGUM, B.O., MONOWAR, L., BACH KNUDSEN, K.E., MUNCK, L., and AXTELL, J. 1983. Nutritional quality of sorghum and sorghum foods from Sudan. Journal of Cereal Science 1(2): 127-137. 24 ref.

The nutritional quality of whole and decorticated sorghum grains from Sudan, and various dishes prepared from sorghum, was determined in rat balance tests. From these tests it is concluded that sorghum is low in lysine, and, therefore, has a low biological value. On the other hand, the true digestibility of protein, as well as digestible energy, is very high with values above 90%. Cooked, fermented and cooked, unfermented, acid-adjusted Aceda had slightly lower digestible energies and lower true protein digestibilities, but higher biological values, than uncooked, fermented Aceda, showing that the protective effect of acidification observed with Ugali did not occur with Aceda. Marissa, a sorghum beer, had a

higher biological value after sieving than did the unsieved brew but true protein digestibility was negatively affected by Marissa preparation.

1226 EL-SANAFIRY, N.Y.A. 1983. Manufacturing of balanced protein as animal protein supplement [sorghum, Egypt]. Ph.D. thesis, Ain-Shams University, Cairo, Egypt. 198 pp. (Summary:Ar).

1227 EUCLYDES, M.P., JUNQUEIRA, R.G., MAFFIA, L.M., and KIBUUKA, G.K. 1983. Characterization of sorghum (Sorghum bicolor) flours processed in maize and wheat mills. 2. Protein quality. (Pt). Revista Ceres 30(169): 199-210. 31 ref. (Summary:En).

Four types of flour were obtained in a conventional mill used for corn; and one type by a Brabender Quadrumatic Senior Mill. A significant difference (P <0.01) was found in the protein composition of the flours. Despite the protein difference, when considered as to digestibility, essential amino acid composition and NPU, no difference was found in terms of the ability of the proteins to satisfy the daily nitrogen needs of a young male adult.

1228 HUQ, R.S., ABALAKA, J.A., and STAFFORD, W.L. 1983. Folate content of various Nigerian foods [sorghum]. Journal of the Science of Food and Agriculture 34(4): 404-406. 4 ref.

1229 JONES, R.E. 1983. Nutritional status of preschool children in Honduras where sorghum is consumed. Ph.D. thesis, Mississippi State University, State College, Mississippi, USA. 125 pp.

A study of preschool children in two rural villages in southern Honduras where sorghum was consumed revealed that children in the villages were receiving a diet deficient in calories, Vitamin A and Vitamin C.

1230 KENT, N.L. 1983. Sorghum and the millets. Pages 202-210 In Technology of cereals. 3rd edn. Oxford, UK: Pergamon Press. 21 ref.

The utilization, human consumption, commercial processing, domestic processing and nutritive value of sorghum and millets are described.

1231 MACLEAN, W.C., JR., LOPEZ DE ROMANA, G., GASTANADUY, A., and GRAHAM, G.G. 1983. The effect of decortication and extrusion on the digestibility of sorghum by preschool children. Journal of Nutrition 113(10): 2071-2077. 18 ref.

Sorghum provided 8% protein and 62% carbohydrate in the study diet. Lysine was supplemented to 3% of protein. Casein provided 6.4% protein kilocalories in the control diet. A mixture of sucrose, dextrimaltose and cornstarch provided carbohydrate. Both diets contained 30% fat kilocalories as soybean-cottonseed oil blend. Balance studies were carried out during the last 6 days of three 9-day dietary periods: control-sorghum-control. Apparent N absorption from sorghum was 81 + or - 4% and did not differ from control. Apparent N retention, 21 + or - 6%, was expectedly lower than the preceding control and following control values. The control values differed significantly from each other. Fecal weights and energy losses showed only minor differences between the two diets. These data suggest that the use of decortication and low cost extrusion processing can markedly

improve the apparent protein quality and digestibility of sorghum.

1232 MASHA, A.C., and SVANBERG, U. 1983. Preparation of weaning foods with high nutrient density using flour of germinated cereals. Food and Nutrition Bulletin 5(2): 10-14. 17 ref.

The preparation of cereal weaning foods of Tanzania was studied. Flours from germinated and ungerminated grains of white (low tannin) and brown (high tannin) sorghum varieties, maize and cassava were prepared. The viscosity was reduced due to germination in the gruels prepared from the sorghum flours. The amounts of white sorghum needed to supply 60% of daily energy requirements for a one yr. child were 2500 ml using ungerminated flour, 1200 ml using ungerminated and 5% germinated flour and 80 ml using germinated flour.

1233 MERCIER, C., and PAULET, J. 1983. Report of study trip to Togo, Upper Volta and Mali, from 13 January to 15 February 1983. (Fr). Nantes, France: Institut National de la Recherche Agronomique. 110 pp.

1234 MERTZ, E.T., KIRLEIS, A.W., and AXTELL, J.D. 1983. In vitro digestibility of proteins in major food cereals. Federation Proceedings 42(5): 6026. (Abstract).

An improved in vitro pepsin assay method was used to compare the digestibility of the proteins in wheat, maize, rice, sorghum and millet. The cooked cereals each had a digestibility value lower than that of the uncooked cereal; the range was 72% (wheat) to 44% (sorghum). A Sudanese fermented children's food made from sorghum or millet maintained its higher level of pepsin digestibility if it is first drum dried before cooking. Similar protection of in vitro digestibility is observed when decorticated sorghum flour is heat extruded before cooking as a gruel.

1235 MOSHA, A.C., SVANBERG, U., LIEDEN, S.A., LJUNGQVIST, B., and HAQ, A. 1983. Effects of germination on the food and nutritional value of sorghum. Pages 18-19 In The production, preservation and processing of food: proceedings of the Sixth International Congress of Food Science and Technology, 18-23 September 1983, Dublin, Ireland (McLoughlin, J.V., and McKenna, B.M., eds.). Dar es Salaam, Tanzania: Tanzania Food and Nutrition Center.

Grain germination has a high potential for reducing dietary bulk and antinutritional factors; improving digestibility, protein quality and vitamin content and making minerals more readily available. The objective of the study was to investigate the effects of germination on sorghum nutritional value and dietary bulk.

1236 MUNDY, J., GIBBONS, G.C., and MUNCK, L. 1983. A comparison of the amylases from sorghum and barley malt. (De). Monatsschrift fuer Brauwissenschaft 36(5): 197.

1237 MUNDY, J., GIBBONS, G.C., and MUNCK, L. 1983. Sorghum and barley malt amylases - a comparison. Journal of the Institute of Brewing 89(3): 135. (Abstract).

The effect of malting conditions and hormonal treatments was studied using immunofluorescent localisation of alpha-amylase isozymes and beta-amylase in sorghum and barley. Alpha-amylase production was predominantly under

scutellar control during the first 3 days of malting. Biochemical studies clarified the relation between the major alpha-amylase isozymes in sorghum and barley. Monospecific antibodies to alpha- and beta-amylase were used to screen sorghum collections for acceptable malting types.

1238 NAIKARE, S.M., and KADAM, S.S. 1983. Physico-chemical characteristics of Bhakari prepared by traditional method from commonly grown cultivars of grain sorghum. Journal of Maharashtra Agricultural Universities 8(1): 80-81. 5 ref.

Bhakaries (roties) of 4 commercial cv. of sorghum were tested in Maharashtra, India for physicochemical properties, organoleptic characteristics, proximate composition and changes in moisture content during storage. Local and M 35-1 showed higher percentage of bran than hybrids. M 35-1 exhibited higher percentage of protein than other 3 cv. M 35-1 ranked top in respect of physicochemical properties and consumer's acceptance followed by local, CSH-5 and CSH-1. The Bhakari prepared from the local cv. had higher moisture content after 12 hr storage than M 35-1. Both the hybrids CSH-5 and CSH-1 exhibited loss moisture retention capacity than M 35-1 and local.

1239 NYMAN, M., SILJESTROM, M., PEDERSEN, B., BACH KNUDSEN, K.E., ASP, N.G., JOHANSSON, C.G., and EGGUM, B.O. 1983. Dietary fiber content and composition in six cereals at different extraction rates. Cereal Chemistry 61(1): 14-19. 41 ref.

An enzymatic method was used to examine the relationship between extraction rate and dietary-fiber content in flours from sorghum and other cereals. Results were compared with neutral-detergent, acid-detergent, and crude-fiber determinations. Dietary fiber content in sorghum increased gradually with the extraction rate. Soluble dietary-fiber content was constant, regardless of the extraction rate. Both arabinose and xylose content increased with the rate of extraction. Acid-detergent and crude fiber comprised only a fraction of insoluble and of total dietary fiber. Detergent methods applied to sorghum gave obscure results.

1240 OKAFOR, N., and ANICHE, G. 1983. West African hop substitute for sorghum lager. Brewing and Distilling International 13(11): 20-21, 32. 16 ref.

The use of a herb, Gongronema latifolium as cheap replacement for hops (Humulus lupulus) in lager brewed from sorghum malt in West Africa is studied. The results of comparison of sorghum wort and beer made with Gongronema and hops indicated that Gongronema could be a useful substitute for hops if its fat content is reduced.

1241 OKEIYI, E.C., and FUTRELL, M.F. 1983. Evaluation of protein quality of formulations of sorghum grain flour and legume seeds. Nutrition Reports International 28(3): 451-462. 30 ref.

Sorghum formulated products (SFP) were developed that included sorghum, wheat and soy flours (SWSoy); sorghum, wheat, cowpea and soy flours (SWCSoy) sorghum, wheat and cowpea flours plus peanut butter (SWCP); sorghum and wheat flours plus peanut butter (SWP); and sorghum and wheat flours plus peanut butter and soy flour (SWPSoy). Protein efficiency ratio (PER) was 2.37 or SWSoy. The PER for SWSoy diet was not different

(P<0.05) from the casein diet. Net Protein Ratio (NPR) values ranked the same as PER and correlated with NPR (P < 0.01). The in vivo digestibility for SWSoy was 90.2% and 81.1% when in vitro method was used. Calculated values in SWSoy met the FAO essential amino acid pattern. The product had a PER above 2.1, contained over 25% of calories as fat, was 17.9% protein and had a net dietary protein/calories of 10% as recommended by the Protein Advisory Group in formulating high protein foods for children.

1242 PATHIRANA, R.A., SIVAYOGASUNDARAM, K., and JAYATISSA, P.M. 1983. Optimisation of conditions for malting of sorghum. Journal of Food Science and Technology 20(3): 108-111. 3 ref.

The conditions studied were the steeping and germination times and the effect of heat treatment on malt quality. The parameters used to assess the malt quality were the malting loss, cold and hot water extracts, reducing sugar content of the extract, diastatic power and liquefying power. A steeping time of 18 hr and a germination time of 4-5 days were found to be optimum for malting. Due to the rapid inactivation of hydrolytic enzymes at high temperatures, kilning at moderate temperatures (around 100 deg C) for short periods (3-4 hr) is recommended.

1243 RAO, B.S.N., VIJAYASARATHY, C., and PRABHAVATHI, T. 1983. Iron absorption from habitual diets of Indians studied by the extrinisic tag technique. Indian Journal of Medical Research 77: 648-657. 28 ref.

Iron absorption from habitual diets based on cereals like rice, wheat and sorghum was determined in adult male volunteers by the extrinsic tag technique. The mean per cent iron absorption from a reference dose of ferrous ascorbate was 29.8 per cent. The food iron absorption was the lowest (0.8-0.9%) with sorghum based diets, highest (4-5%) with rice based diets and intermediate (1.7-1.9%) with wheat based diets.

1244 RAO, K.S.J. 1983. Pellagra in sorghum eaters: a mycotoxicosis? Ecology of Food and Nutrition 13(1): 59-62. 20 ref.

Pellagra has been associated with niacin deficiency. As sorghum is rich in niacin, the cause of pellagra in patients on sorghum based diets was investigated. Intakes of sorghum, niacin, leucine and vitamin B6 in the sorghum-eating areas of the 3 southern states in India were compared. Sorghum and rice production in these states, food consumption pattern, the relationship between niacin deficiency and pellagra were studied. Environmental factors and harvest practices were important in the susceptibility of grain to fungal attack and in mycotoxin elaboration.

1245 SARODE, R.N., SHASTRI, P.N., and RAO, B.Y. 1983. Studies on utilisation of sorghum flour for biscuits. Indian Journal of Nutrition and Dietetics 20: 213-215. 9 ref.

The possibility of partial and complete replacement of wheat flour by sorghum flour of 3 different varieties was studied. It was observed that complete replacement of wheat flour could not give an acceptable product. However blending of the sorghum flour (CSH5 variety) with wheat flour in 80:20, or 60:40 ratio could give an acceptable product.

1246 SOWBHAGYA, H.B., DEVI, A.U., and VISWESWARIAH, K. 1983. Chlorinated insecticide residues in certain food samples. Indian Journal of Medical Research 78: 403-406. 7 ref.

To assess the magnitude of contamination in rice, sorghum and wheat flour samples, a sample survey was conducted by collecting random samples in and around Mysore, India. The results revealed that 20% rice samples and 30% of wheat flour samples contained BHC and DDT residues above the national tolerance limit. None of the sorghum samples contained pesticide residues above the safety limit due to the preservation of sorghum in pit storages by farmers.

1247 SUBRAMANIAN, V., JAMBUNATHAN, R., and RAO, N.S. 1983. Textural properties of sorghum dough. Journal of Food Science 48(6): 1650-1652, 1673. 16 ref.

Textural properties of dough prepared from the flours of 8 sorghum cv. were evaluated subjectively and also measured using a back-extrusion cell in an Instron Food Testing Instrument. The force and energy required for the extrusion of good quality cohesive dough were high. A poor quality dough was compressed into the cell without extrusion. The influence of flour-water-soluble components on dough cohesiveness are discussed.

1248 WILLS, R.B.H., and ALI, M.R. 1983. Effect of grain size on degree of milling, color and cooking time of sorghum. Journal of Food Science 48(2): 650-651. 8 ref.

Sixteen coloured and white hybrid sorghum cultivars were size-graded and the three major sizes, 4.00-4.74 mm, 3.35-3.99 mm and 2.80-3.34 mm, dehulled for 60 sec. Within a cultivar the degree of milling (loss of unbroken kernel during milling) varied between individual sizes and was lower for the smaller grain. The pericarp content increased 2.80 > 4.00 > 3.35 mm+ grain. The colour of ground pearled grain of 4.00 mm+ and 3.35 mm+ sizes was similar to that of white cultivars but 2.80 mm+ grain had a higher colour absorption due to some residual pericarp. The cooking time ranged from 54min to 64 min and was shorter for the smaller grain.

1249 WILLS, R.B.H., and ALI, M.R. 1983. Effect of grain size on dehulling of sorghum. Cereal Chemistry 60(1): 12-14. 10 ref.

Ungraded and sized grain (<4.00 mm; <3.35 and <2.80 mm, respectively) of 28 sorghum cultivars were dehulled by abrasion for 60 sec. The milling recovery varied between cultivars but generally ranged from 80 to 90%. The milling recovery was higher for grain <2.80 mm than for grain <3.35 mm, and grain <4.00 mm gave the lowest recovery. The recovery of ungraded grain did not follow a trend but often gave yields lower than what would be expected from the average size. The amount of unbroken kernels in the fraction also varied with grain size, with the average amounts obtained for <2.80-, <3.35-, and <4.00-mm grain being 84, 78, and 72%, respectively. Broken kernels accounted for most of the damaged grain, with only a small proportion of degerned kernels present. For optimal yields during dehulling, cultivars with grain of nonuniform size should be segregated into different sizes and each size grade dehulled for different times.

Industrial and Other Uses

1250 ALLARD, J.L., BERTHEAU, Y., DREVON, J.J., SEZE, O., and GANRY, F. 1983. Crop residue resources and potential for biogas production in Senegal. (Fr). Agronomie Tropicale 38(3): 213-221. 11 ref. (Summaries: En, Es).

The suitability of sorghum and other crop residues for biogas production and the best types of fermentors for 3 climatic areas of Senegal are discussed.

1251 ANDREAS, J.H., and SANDERS, D.C. 1983. Seeding carrots (Daucus carota) into mulch crops [sorghum, sudan grass] to improve stand. HortScience 18(4 Sect. 2): 590. (Abstract).

1252 BAARD, S.W., and LAUBSCHER, C. 1983. Effect of crop residues and alternative crops on the survival of Thielaviopsis basicola in blackhull-inducing soil. Phytophylactia 15(4): 145-148. 21 ref. (Summary:Af).

Propagule numbers of Thielaviopsis basicola rapidly declined in lucerne-amended soil. Groundnut residues also caused a significant decline, but maize, sorghum, wheat and oats had no efect. In soil amended with the same residues and planted with groundnuts, disease incidence was not affected, but propagule numbers increased in lucerne-amended soil. In soil cropped with maize, oats, wheat, groundnuts, lucerne, or sorghum, propagule numbers declined significantly only in the presence of lucerne. Living roots of lucerne, sorghum, wheat, and groundnuts were colonized and T. basicola was also capable of colonizing saprophytically the residues of lucerne, wheat, maize and oats.

1253 BASSHAM, J.A. 1983. Biomass production potential. Proceedings of the Soil and Crop Science Society of Florida 42: 2-8.

Comparisons are made of the energy content and characteristics of various biomass fuels, especially Bermuda grass, sudan grass and sorghum, with fossil-derived fuels.

1254 BELAY, T., and SHARMA, G.C. 1983. Evaluation of crops [sorghum] as raw materials for energy production [alcohol production]. Annual Research Report, Alabama Agricultural and Mechanical University, School of Agriculture, Environmental Science and Home Economics 12: 27-34.

1255 DOHERTY, C.A., and MORAD, M.M. 1983. Alcohol production and utilization of dried distillers grain from sorghum. College Station, Texas, USA: Texas Agricultural Experiment Station. 52 pp.

1256 EGG, R.P., SWEETEN, J.M., and COBLE, C.G. 1983. Stillage recycling: effect on ethanol yield, energy consumption, and stillage quality. Paper, American Society of Agricultural Engineers no. 83-3570. 11 pp. 4 ref.

Sorghum stillage was recycled as cooking water in ethanol production experiments. The quality of the resulting stillage was improved. The stillage did not affect ethanol yield, energy consumption and water use.

1257 FORNEY, D.R., FOY, C.L., and WOLF, D.D. 1983. Allelopathy in sorghum-sudangrass hybrids? Proceedings of the Southern Weed Science Society 36: 358. 1 ref. (Abstract).

Root exudates of sorghum x sudangrass hybrids as weed suppresants and soil conditioners prior to no-tillage Medicago sativa, Lolium multiforum was more sensitive than curled cress to methylene chloride extracts of root exudates from hybrid cv. Dekalb Sx17+.

1258 JAYASURIYA, M.C.N. 1983. The use of fibrous residues in South Asia. Pages 40-51 In The use of organic residues in rural communities (Shacklady, C.A., ed.). Tokyo, Japan: United Nations University. 10 ref.

Uses of crop residues including sorghum in India and Pakistan, the improvement of their nutritive values are described.

1259 KISGECI, J., and PEKIC, B. 1983. Sorghum growing in Vojvodina in order to obtain alcohol as a blend with gasoline for motor fuel. (Sh). Bilten za Hmelj, Sirak i Lekovito Bilje 15(43-44): 1-165. 31 ref. (Summary:En).

The study of grain hybrid varieties of sorghum and sweet sorghum for alcohol production in Vojvodina, Yugoslavia indicated that the highest yield was not always connected with highest alcohol yield. Varieties with high percentage of husk and hybrids as second crops were not suitable for alcohol production. Proposals for technological processing, building of factories, and machinery are given.

1260 KULKARNI, S.D., and PHARANDE, K.S. 1983. Use of sorghum stubble mulch for soil erosion control in Vertisols. Sorghum Newsletter 26: 58.

Findings indicate the positive effect of sorghum stubble mulch for controlling splash erosion in a Vertisol soil. Application of sorghum mulch stubble at 1.25, 2.5, and 5t/ha reduced the splash erosion by 25, 67, and 89%, respectively and the reduction in inter-rill erosion, however, was reduced, 11, 57 and 74%, respectively. The splash/inter-rill erosion ratio was also reduced from 2.17 to 0.94 with increases in mulch rates.

1261 LE GRAND, F 1983. Pre-treatment method for specific crops to increase reducing sugars content for potential methane production. Pages 310-313 In Third Annual Solar and Biomass Workshop, 26-28 April 1983, Atlanta, Georgia, USA. Washington, D.C., USA: United States Department of Agriculture. 2 ref.

Pre-treatment with a mild hydrolysis process under moderate steam pressure and a short time lapse appeared to be highly successful for forage sorghum and napier grass, yielding 43.6 and 34.2% reducing sugars in dry plant material, respectively.

1262 MASUD, S.M., LACEWELL, R.D., and HILER, E.A. 1983. Economic implications of cotton gin trash and sorghum residues as alternative energy sources. Energy in Agriculture 1(3): 267-280. 8 ref.

For on-farm energy production, grain sorghum residue and cotton gin trash are evaluated in an electricity generation and gasification context. A large cooperative for production of low Btu gas from crop residues and grain sorghum is also discussed.

1263 MILLER, G.C., MILLER, W.W., HANKS, L., and WARREN, J. 1983. Soil sorption and alfalfa uptake of strychnine. Journal of Environmental Quality 12(4):

526-529. 11 ref.

Potential uptake of strychnine in alfalfa was investigated by applying treated milo (Sorghum vulgare var. subglabrescens) bait to the base of alfalfa plants at rates that exceeded normal rodent treatments.

1264 NARAYANASAMY, P., and RAMIAH, M. 1983. Characterisation of antiviral principle from sorghum leaves. Pages 15-17 In Proceedings of the National Seminar on Management of Diseases of Oilseed Crops, 21-22 January 1983, Madurai, Tamil Nadu, India (Narayanasamy, P., ed.). Madurai, Tamil Nadu, India: Tamil Nadu Agricultural University. 6 ref.

Effect of air drying on AVP activity and fractionation of AVP from sorghum leaves was studied. AVP from sorghum was precipitated when ammonium sulphate was added. Less number of local lesions were formed in the leaves of cowpea in which the primary leaves were treated with AVP.

1265 NARAYANASAMY, P., MUTHUSAMY, M., RAMIAH, M., and SUBRAMANIAN, N. 1983. Comparison of efficacy of antiviral principles and insecticides against tomato spotted wilt virus. Pages 18-20 In Proceeding of the National Seminar on Management of Diseases of Oilseed Crops, 21-22 January 1983, Madurai, Tamil Nadu, India (Narayanasamy, P., ed.). Madurai, Tamil Nadu, India: Tamil Nadu Agricultural University. 4 ref.

The field experiments to test the comparative efficacy of insecticides and antiviral principles from leaves of sorghum (SAVP) and coconut (CAVP) showed that the incidence of tomato spotted wilt virus on groundnut was significantly reduced by the application of SAVP and CAVP alone or in combination with insecticides.

1266 PRINE, G.M., and MISLEVY, P. 1983. Grass and herbaceous plants for biomass. Proceedings of the Soil and Crop Science Society of Florida 42: 8-12. 6 ref.

DM yields are presented of annual and perennial grasses and herbaceous plants grown in Florida to meet energy requirements. Higher DM yields in Florida ranged from 53 Mg/ha for sorghum.

1267 PUTNAM, A.R., and DEFRANK, J. 1983. Use of phytotoxic plant residues for selective weed control. Crop Protection 2(2): 173-181. 28 ref.

Populations of Portulaca oleracea and Digitaria ischaemum were reduced by 70% and 98%, respectively, by residues of sorghum. The use of Populus wood shavings as a control mulch allowed separation of physical and chemical aspects of the residues. Glasshouse experments with two soils confirmed both weed-suppressing and crop-stimulating effects of sorghum residues. Water extracts of sorghum herbage were toxic to indicator species in sterile bioassays suggesting that phytotoxins are directly released by the plant residues.

1268 PUTNAM, A.R., DEFRANK, J., and BARNES, J.P. 1983. Exploitation of allelopathy for weed control in annual and perennial cropping systems. Journal of Chemical Ecology 9(8): 1001-1010. 27 ref.

Sorghum and other crops were evaluated for their weed suppressent capability. The most effective system was to grow these cover crops to a ht. of 40-50 cm, desiccate by contact herbicides or

freezing and allow the residues to remain on the soil surface. Upto 95% control of weeds was obtained after 30-60 day period of desiccation.

1269 SAINI, R.C., and RAJVANSHI, R. 1983. Decomposition of crop residues in soil. Geobios 10(1): 24-27. 7 ref.

At the time of crop harvest, the plant residues added 90 g C m-2 to the soil. Sorghum residues were characterised by low N and TNC: and high percentage of lignin, cellulose, ash, and carbon. The cumulative CO2 evolution from amended and control soils indicated low rates of decomposition.

1270 SHIN, K.C., HONG, B., and FAN, L.T. 1983. Fermentative production of butanol from sorghum molasses. Pages 253-269 In Wood and agricultural residues: research on use for feed, fuels, and chemicals (Soltes, E.J., ed.). Orlando, Florida, USA: Academic Press. 33 ref.

A strain, Clostridium acetobutylicum ATCC 4259, suitable for butanol-acetone fermentation of sorghum molasses was selected and cultivated in the composition-optimized sorghum molasses medium. The microbial growth and sugar consumption pattern in the sorghum molasses medium exhibited a typical diauxie phenomenon. The results suggest that the difficulty encountered by the Weizmann type of organisms in butanol-acetone fermentation of molasses is due to the diauxie phenomenon causing a significant decrease in the solvent production rate. Acid hydrolysis of sorghum molasses minimizes the occurrence of the phenomenon, thereby remarkably increasing the solvent yield. The total solvent yield in the inverted sorghum molasses medium was 30.3% based on the weight of sugar consumed.

1271 SWEETEN, J.M., COBLE, C.G., and EGG, R.P. 1983. The use of grain sorghum in integrated food and fuel production systems. Pages 63-73 In Alternative energy sources (Veziroglu, T.N.). Amsterdam, Netherlands: Elsevier Scientific Publishing Co.

1272 TAYLOR, J.R.N. 1983. Effect of malting on the protein and free amino nitrogen composition of sorghum. Journal of the Science of Food and Agriculture 34(8): 885-892. 28 ref.

When sorghum is malted much of the N in the kernel is transferred to the roots and shoots. Examination of Osborne protein fractions extracted from the kernel reveals that the prolamins are the major source of the nitrogen transferred. Electrophoretic prolamin bands remained unchanged during malting, indicating that prolamins are degraded directly to small peptides and amino acids. There was a general decline in the number of glutelin proteins whereas some albumin plus globulin proteins increased in quantity while others decreased. In the roots and shoots there was a considerable increase in both protein nitrogen and non-protein nitrogen as a result of the translocation of the products of storage protein breakdown from the kernel. Increases occurred in all of the 9 essential amino acids determined. Quantitatively, the two most important free amino acids of sorghum malt appear to be asparagine and glutamine.

1273 WALAWENDER, W.P. 1983. Fluid-bed gasification of crop residues. Pages 112-115 In Third Annual Solar and Biomass Workshop, 26-28 April 1983, Atlanta, Georgia, USA. Washington, D.C., USA: United States Department of Agriculture.

Corn stover, wheat straw and sorghum stover were gasified in a 0.23 m I.D. fluid-bed over a temperature range of 800-1200 K. Volumetric gas yield and heating value were fairly close for straw and corn stover while sorghum gave a higher yield and a lower heating value than the other materials. Mass yield of gas was relatively close for straw and sorghum stover while it was lower for corn stover.

ECONOMICS AND MARKETING

1274 AUBERT, C. 1983. Food policy for the third world. Nutrition and Health 2(1): 41-46. 2 ref.

To illustrate the interdependence of the patterns of production and consumption in industrial and in developing countries, the ingredients of a typical French meal (sorghum) are examined.

1275 BAGAYOKO, M. 1983. The Dogon farmer's agricultural income [sorghum]: possibilities of improving and investing this income for a better living condition of the farmer [Mali]. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 69 pp.

1276 CHANGULE, R.B., KALYANKAR, S.P., and GARUD, T.B. 1983. Economics of winter sorghum cultivation. Sorghum Newsletter 26: 56.

An attempt was made to determine the economics of CSH-8 (R) and M-35-1 sorghum varieties for farmers at the existing level of technology in India. The cultivation of CSH-8(R) was more profitable than the cultivation of M-35-1. The most important expenditures were for labour, manures, and fertilizers.

1277 CISSE, F.Y. 1983. Woman's role in the agricultural production [sorghum] in the ODIPAC zone of Kita [Mali]. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 61 pp.

1278 DANSIRA, A. 1983. Agricultural price policy [sorghum] in Mali: evaluation and perspectives. (Fr). Thesis, Ecole Normale Superieure, Bamako, Mali. 76 pp.

1279 DEWALT, B.R. 1983. Anthropology's contribution to the International Sorghum/Millet Program. Practicing Anthropology 5(3): 6, 10.

The sociocultural constraints in the production and consumption of sorghum and millet in Sudan and southern Honduras are studied as apart of INTSORMIL's overall goal of increasing the world-wide production of sorghum and millets.

1280 DIOP, A.B. 1983. Results of the campaign 1982-1983, the agricultural campaign 1983-1984, preparation of the campaign 1984-1985 (Senegal). (Fr). Dakar, Senegal: Ministere du Developpement Rural. 18 pp.

1281 DURAND, W., and VEGA SALAZAR, A. 1983. Study on the management of the local cereals center for the conservation and marketing of maize-beans-sorghum: cooperatives KIBEB-KOPTAD. (Fr). Port-au-Prince, Haiti: Department de l'Agriculture, des Ressources Naturelles et du Developpement Rural. 48 pp.

1282 ESPINAL ZUNIGA, G. 1983. Production, credit and marketing policies for basic grains [maize, rice, beans, sorghum] in Honduras. (Es). Thesis, Universidad Nacional Autonoma de Honduras, Tegucigalpa, Honduras.

79 pp. 22 ref.

1283 FARAG, A.S. 1983. The impact of foreign trade of major exported and imported Egyptian crops on economic development [rice, potatoes, citrus, onion, wheat, maize, sorghum]. (Ar). M.Sc. thesis, Alexandria University, Alexandria, Egypt. 178 pp. (Summary:En).

1284 FIELDER, L.L. 1983. An analysis of changes in the acerage and yield of cotton, rice, sugarcane, soybeans, corn, wheat, and sorghums in Louisiana. DAE Research Report, Louisiana Agricultural Experiment Station no. 613. 78 pp.

1285 HACHIMY, L. 1983. Perspectives of integrated development [sorghum cultivation] in the area of Banamba [Mali]: socioeconomic aspects. (Fr). Thesis, Institut Polytechnique Rural, Katibougou, Mali. 47 pp.

1286 HONDURAS:INSTITUTO INTERAMERICANO DE CIENCIAS AGRICOLAS, HONDURAS:INSTITUTO NACIONAL AGRARIO, and HONDURAS:CONSEJO SUPERIOR DE PLANIFICACION ECONOMICA. 1983. Project for the peasant group Angel del Limon, El Triunfo, Choluteca [Zea mays, sorghum, Sesamum indicum, Manihot esculenta, economic analysis, Honduras). (Es). Tegucigalpa, Honduras: Instituto Interamericano de Ciencias Agricolas, Instituto Nacional Agrario, and Consejo Superior de Planificacion Economica. 12 pp.

1287 HONDURAS:SECRETARIA DE RECURSOS NATURALES, DIRECCION DE PLANIFICACION SECTORIAL. 1983. Survey analysis of basic grains stock and prices in the main markets of the country, April-June 1983 [maize, beans, sorghum, rice, Honduras]. (Es). Tegucigalpa, Honduras: Secretaria de Recursos Naturales, Direccion de Planificacion Sectorial. 21 pp.

1288 HONDURAS:SECRETARIA DE RECURSOS NATURALES, DIRECCION DE PLANIFICACION SECTORIAL. 1983. Survey analysis of basic grains stock and prices in the main markets of the country, January-March 1983 [maize, beans, sorghum, rice, Honduras]. (Es). Tegucigalpa, Honduras: Secretaria de Recursos Naturales, Direccion de Planificacion Sectorial. 18 pp.

1289 HONDURAS:SECRETARIA DE RECURSOS NATURALES, HONDURAS:BANCO NACIONAL DE DESARROLLO AGRICOLA, and HONDURAS:INSTITUTO HONDURENO DE MERCADEO AGRICOLA. 1983. Inter-institutional operative plan for the production of basic grains, 1983-1984 [maize, beans, sorghum, rice, Honduras]. (Es). Tegucigalpa, Honduras: Secretaria de Recursos Naturales, Banco Nacional de Desarrollo Agricola, and Instituto Hondureno de Mercadeo Agricola. 108 pp. 12 ref.

1290 ICRISAT. 1983. Economics. Pages 307-333 In Annual report 1982. Patancheru, Andhra Pradesh, India: ICRISAT.

In this chapter of the report, assessment of deep Vertisol technology options, features of traditional village farming systems, size and composition of rural income, determinants of rural villager's wage, risk in India's semi-arid tropics, agricultural marketing and future plans of research on ICRISAT's mandate crops including sorghum are presented.

1291 KALYANKAR, S.P., and ALI, M.A. 1983. Economics of hybrid jowar (CSH-1) seed production in Maharashtra State. Sorghum Newsletter 26: 56.

The input/output ratio was 1:1.45 and the average yield of CSH-1 was

8.5 q/ha.

1292 KANDIL, M.S.A. 1983. Irreliability of using the food balance sheet approach for estimating national consumption of major cereals. (Ar). Annals of Agricultural Science (Egypt) 28(2): 1065-1097. (Summary:En).

The alternative approaches used in estimating consumption of sorghum, wheat, maize and rice in Egypt are studied using data on food commodity balances and family budget surveys concerning these grains during 1960-80. Consumption estimates obtained according to food commodity balances approach exceeded those obtained according to family budget surveys over all the period of study due to the inaccuracy of production and stock estimates, as well as to the animal consumption estimates of grains which are used for food and animal feed.

1293 KELLER, O., and FERRERO, N. 1983. Available technology for the cultivation of grain sorghum. (Es). Publicacion Miscelanea, Estacion Experimental Regional Agropecuaria Rafaela (Argentina) no. 22. 22 pp.

1294 KLIEBENSTEIN, J.B., and MCCAMLEY, F.P. 1983. Energy-related input demand by crop producers. Southern Journal of Agricultural Economics 15(2): 63-69. 28 ref.

An E-V analysis model is used to examine energy use adjustments to changes in energy and crop prices. Increases in sorghum prices increased energy use due to the decrease in risk aversion.

1295 KONATE, D. 1983. Critical analysis of Malian experience in agricultural development [sorghum]. (Fr). Thesis, Ecole Normale Superieure, Bamako, Mali. 75 pp.

1296 KRISHNAMOORTHY, C.H. 1983. Low input cropping systems. Pages 477-491 In Potential productivity of field crops under different environments (Smith, W.H., and Banta, S.J., eds.). Los Banos, Laguna, Philippines: IRRI. 7 ref.

Costs of fertilizer, pesticides and machinery are given for sorghum production in India.

1297 LEATH, M.N., and HILL, L.D. 1983. Grain movements, transportation requirements, and trends in United States grain marketing patterns during the 1970s. Urbana-Champaign, Illinois, USA: University of Illinois, College of Agriculture, Agricultural Experiment Station. 57 pp. (North Central Regional Research Publication no. 288, Southern Cooperative Series Bulletin, 282, and Illinois Bulletin, 777).

Detailed information on grain movements during 1977 was collected from 3,500 firms in 41 states. Information on the origin, destination, and mode of transport used was collected for barley, corn, flaxseed, oats, rye, sorghum, soybeans, and wheat in each participating state. Summary of the marketing patterns for individual grains and the transportation requirements for all grain movements is presented.

1298 LEVIS, R. 1983. Fodder grains [sorghum, international trade, USA, Argentina]. (Es). Anales de la Sociedad Rural Argentina 117(6): 12-13.

1299 MURTY, K.N. 1983. Consumption and nutritional patterns of ICRISAT mandate crops [sorghum] in India. Patancheru, Andhra Pradesh, India: ICRISAT. 27

pp. 22 ref. (Economics Program Progress Report no. 53). (Limited distribution).

Linear expenditure systems are estimated separately for 10 rural/urban expenditure groups using pooled time series of cross sections data published by the National Sample Survey Organization, India. Efforts are made to link consumption patterns with income distribution. Demand parameters are translated from quantity to nutritional dimension, viz, calorie consumption. Sorghum is found to supply more than 10% of calorie intake.

1300 PETERSON, E.W.F., PANIKER, A.P., RILEY, H.M., and SORENSON, V.L. 1983. Spain's entry into the European Community: effects on the feed grain [sorghum] and livestock sectors. Foreign Agricultural Economic Report, US Department of Agriculture no. 180. 101 pp.

1301 RAO, P.P., and RYAN, J.G. 1983. Fertilizer response of improved sorghum cultivars at ICRISAT Center. Patancheru, Andhra Pradesh, India: ICRISAT. 18 pp. (Economics Program Progress Report no. 47). (Limited distribution).

The paper analyzes the response of hybrid sorghum cv. to N and P205 from fertilizer experiments on Vertisols conducted at ICRISAT, India under rainfed conditions. Using response functions derived from the experiments it was found that grain yields were maximized (i.e., 3702 kg/ha) at 128 kg N and 64 kg P205 per ha. Under situations where capital is not a major constraint the optimum economic level of fertilizer from the response function at 1980-81 prices was 103 kg N and 53 kg P205 per ha. The optimum levels may not alter substantially with changes in fertilizer/sorghum price ratios.

1302 RAO, P.P., and VON OPPEN, M. 1983. Village consumers preference for sorghum varieties and its relationship to sorghum preference index. Patancheru, Andhra Pradesh, India: ICRISAT. 20 pp. 4 ref. (Economics Program Progress Report no. 50). (Limited distribution).

In this study 12 sorghum varieties (originating partly from the urban wholesale market and partly from breeders' fields) were tested in actual consumer trials to assess village consumers' preferences in Andhra Pradesh, India. Based on the village consumers' scores these 12 varieties were ranked in order of preference. A rank correlation showed that these ranks were significantly correlated for all household categories together. A simultaneous test based on regression analysis gave similar results and a set of dummy variables showed that the villagers were not influenced or biased by the design or conduct of the study. On average all the household categories in the village showed preferences for local varieties of sorghum as compared to HYVs. This preference for locals was expressed particularly strongly when consumers were asked to assess flour samples and thus could not see the outer appearance of the grains.

1303 RAO, V.R., RAO, M.S.R.M., and SELVARAJAN, S. 1983. Evaluation of improved farming practices in rainfed rabi sorghum for their feasibility and viability on macro plots. Andhra Agricultural Journal 30(2): 71-76. 12 ref.

Recommended low and high monetary production techniques developed at Bellary, India for determining the production of rainfed sorghum were tested and evaluated for their

feasibility and profitability under diverse seasonal conditions. Averaged over 5 consecutive diverse seasons, adoption of simple low cost practices at the Research farm resulted in an increased grain yield of 565 kg/ha with a net return of Rs 953/ha over the conventional farmers' practices in the region. Addition of costly inputs like fertilizers to low monetary inputs further boosted yields by 56% and net returns by 37%. When tested as a single package, improved dryland technology currently advocated for rabi sorghum gave 1312 kg/ha grain yields with a net return of Rs 1397/ha at Research farm and 952 kg/ha grain yields and Rs 781/ha net returns at farmers' fields as compared to 275 kg/ha of grain yields and Rs 69/ha of net returns from the prevailing practices. The studies highlighted considerable scope for trebling the present per ha yields of rabi sorghum around 1000 kg/ha with the available technology.

1304 REDDY, K.V., and REDDY, V.R. 1983. Growth rates: South India. II. Trends in agricultural growth in Andhra Pradesh: problems and prospects. Agricultural Situation in India 38(6): 395-401.

The paper examines the magnitude of growth and fluctuations in the area and the production of sorghum, rice, groundnuts, pearl millet and horse gram in Andhra Pradesh, India during the period 1956/57 - 1977/78. Fluctuations were found to be higher during the green revolution period.

1305 SATISH, S., GURUMURTHY, and MISHRA, S.K. 1983. Cycles in jowar markets: an use of harmonic analysis. Indian Journal of Agricultural Economics 38(1): 77-82. 7 ref.

The detection of the presence of a 12 months' cycle and a long term cycle in the arrival and price series of sorghum markets in Karnataka, India was made by Harmonic analysis. Trignometric functions were used in discovering the periodicities present in the price and arrival series of sorghum markets. Monthly modal data on price and arrivals were subjected to time series analysis. Time lag reflected the imperfections in the market conditions, mainly the supply condition and time involved in transportation.

1306 SHUMWAY, C.R. 1983. Economic interrelationships in Texas field crop production. Technical Report, Texas Agricultural Experiment Station no. 83-1. 36 pp.

Technology, supply, and demand relationships of 6 field crops of Texas, USA including sorghum are studied using a dual approach. Cotton, sorghum, and maize were found to be homothetically separable.

1307 SHUMWAY, C.R. 1983. Supply, demand, and technology in a multiproduct industry: Texas field crops. American Journal of Agricultural Economics 65(4): 748-760. 37 ref.

Technology, supply, and demand relationships among 6 Texas field crops including sorghum and 3 variable inputs are investigated using a dual approach. Cotton, sorghum, and corn were homothetically separable. No larger groups of outputs nor any input groups satisfied the sufficient dual conditions for consistent aggregation and two stage choice. Product supply and input demand equations were estimated. Estimates are inconsistent with expectations of the competitive model. The

normalized profit function Hessian is not positive definite, and parameter symmetry is rejected.

1308 SMITH, E.G., SMITH, R.D., and ANDERSON, C.G. 1983. Will 1983 follow short-crop price scenario? Food and Fiber Economics, Texas Agricultural Extension Service, Texas A and M University System 12(7). 4 pp.

1309 SONAR, K.R., KUMBHAR, D.D., SHINDE, S.S., and PATIL, N.D. 1983. Yield targetting in winter sorghum. Sorghum Newsletter 26: 58-59. 2 ref.

Results indicated that it is possible to achieve yield targets of winter sorghum up to 60 q/ha. When 50 q/ha yield target and recommended fertilizer dose treatments were compared, an expenditure of Rs. 220/ha was saved on fertilizer without affecting the crop yield to increase benefit/cost ratio from 3.2 to 3.9. The highest benefit/cost ratio of 4.9 was observed under 40 q/ha yield target.

1310 SONAR, K.R., KUMBHAR, D.D., SHINDE, S.S., BADGUJAR, C.B., and PATIL, N.D. 1983. Yield targetting in rabi sorghum. Journal of Maharashtra Agricultural Universities 8(3): 298-299. 7 ref.

Data from a field experiment in Rahuri, India on sorghum yield and NPK uptake and availability were used to calculate NPK requirements for grain production. Yield targetting equations were derived from these calculations and their validity was tested in another field experiment.

1311 SONAR, K.R., SHINDE, S.S., KUMBHAR, D.D., and PATIL, N.D. 1983. Yield targetting in sorghum (cv. CSH-5). Sorghum Newsletter 26: 59-60. 2 ref.

The yield targets of 30, 40, and 50 q/ha were easily achieved. When 40 q/ha yield target and recommended dose treatments were compared, an expenditure of about Rs. 530/ha was saved on fertilizer without affecting the yield. The benefit/cost ratio increased from 3.6 under recommended dose to 6.1 under 40 q/ha yield target. In the case of 50 q/ha yield target, an expenditure of Rs. 250/ha was saved on fertilizer, but the profit was increased by about Rs. 1200/ha compared to that of the recommended fertilizer dose treatment.

1312 UK:ECONOMIST INTELLIGENCE UNIT. 1983. World commodity outlook 1984. Food, feedstuffs, and beverages. London, UK: Economist Intelligence Unit. 118 pp.

The survey also reviews prospects for sorghum.

FORAGE SORGHUM

1313 AHLUWALIA, M., and SOLOMON, S. 1983. Forage sorghum for biomass and animal production integrated cropping system. Page 508 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Soil-plant-animal integral forage production systems in India are aimed at sustainable bio-mass production potentials with higher energetics for animal production for a particular environmental condition.

1314 AKITA, T., MATSUDA, H., MORIMOTO, Y., and NAKAI, S. 1983. Studies on the making of whole crop silage preparation by dual purpose sorghum. 1. Influence of the

seeding time on the growth and yield. (Ja). Bulletin of Hyogo Prefectural Experiment Station of Animal Husbandry 20: 91-93.

1315 AL-KHAZALY, A.A.A. 1983. Effect of seed rates, sowing methods and nitrogen fertilizer on yield and quality of sudan grass (Sorghum sudanense) in Iraq. (Ar). M.Sc. thesis, Salah Al-Din University, Arbil, Iraq. 108 pp. 82 ref. (Summary:En).

Two field experiments were carried out at Shahrazoor and Kulysane, in Sulaimaniyah province, Iraq. It was found that at Shahrazoor 48 kg seeding rate/ha outyielded 24 and 36 kg seeding rate/ha, but at Kulysane there were no significant differences between the rates 48 and 36 kg/ha, which were outyielded 24 kg seeding rate/ha. The forage yields were increased by increasing N level from nil to 120 and 240 kg N/ha in both experiments, also increasing N level from nil to 120 or 240 kg N/ha increased the average stem diameter for all cuts in Kulysane experiment.

1316 ANDO, T., KOUNO, K., AKAGI, E., and OGATA, S. 1983. Studies on dry matter and protein production by forage crops. 1. Effects of plant density and nitrogen application rate on dry matter and protein production by sorghum. (Ja). Japanese Journal of Soil Science and Plant Nutrition 54(6): 467-472. 15 ref.

1317 BAJWA, M.S., HUSSAIN, M.R., AKHTAR, M., BANARAS, M., and ZAFARULLAH. 1983. Effect of different nitrogen levels and harvest stages on the yield and quality of sorghum fodder. Pakistan Journal of Scientific and Industrial Research 26(3): 148-151. 13 ref.

It was observed from an experiment conducted at Pakistan that the height of the plant and number of leaves per plant increased significantly by the application of N over control. Similarly stages of harvesting differed considerably from one another in these respects. There was a linear increase in green fodder yield as the N rate was increased from 24 to 48 Kg/acre. It was also observed that there was relative increase in protein and fat contents with the increase of N rate but these contents were considerably decreased when the crop was harvested 75 days after planting.

1318 BANGARWA, K.S., LODHI, G.P., and MEHTA, S.L. 1983. Association of forage yield and some quality traits in sorghum. Sorghum Newsletter 26: 8.

Green fodder yield was positively and significantly associated with all characters, viz., dry matter, leaf weight, stem weight, protein, and in vitro dry matter digestibility. Dry matter was also positively and significantly associated with all the characters except IVDMD for which association was nonsignificant.

1319 BARTZ, J.K., and JONES, R.L. 1983. Availability of nitrogen to sudangrass from ammonium-saturated clinoptilolite. Soil Science Society of America Journal 47(2): 259-262. 20 ref.

Clinoptilolite, a zeolite and a highly selective exchanger for Ammonium ions, was evaluated as an ammonium fertilizer carrier by addition to Flanagan and Cisne slit loam soils at levels of 0.15, 0.50, 0.75 or 1.50% zeolite by wt. These were equivalent to fertilizer rates of 24, 79, 110 or 235 mg N/kg soil. The total DM yield of pot-grown Sudan grass was 30.21 g/pot and 39.69 g on Flanagan soil.

On Cisne soil which had a lower natural fertility, the yields were 11.75 g and 32.7 g, resp. In a comparison treatment of ammonium sulphate at the equivalent of 79 mg N/kg soil, yields on Flanagan and Cisne soils. resp., were 37.56 and 26.51 g/pot.

1320 BARZANI, R.A. 1983. Effect of rate of seeding, inter row spacing and nitrogen on the yield and HCN content of the forage of sorghum [Iraq]. (Ar). M.Sc. thesis, Baghdad University, Baghdad, Iraq. 93 p. 48 ref. (Summary:En).

1321 BHANOT, J.P., VERMA, A.N., and LODHI, G.P. 1983. Losses caused by sorghum shootfly, Atherigona soccata (Rondani) in some commonly grown forage sorghum varieties. Journal of Research, Haryana Agricultural University 13(2): 304-306. 5 ref.

Pre-sowing furrow application of disulfoton 5G @ 2.5 kg a.i./ha to 4 varieties of forage sorghum resulted in overall 13.1% reduction in dead hearts caused by shootfly; and 15.0 and 25.0 per cent increase in green fodder and dry matter yields, respectively. Increase in dry matter yield was more (39.2%) in variety IS 4776 than in variety SSG 59-3 (6.3%) and IS 6090 (19.0%). This recommendation is considered to be economical only when the pest incidence is severe.

1322 BISHNOI, L.K. 1983. Canopy development, light interception, leaf photosynthesis and respiration in maize (Zea mays L.), sorghum (Sorghum bicolor (L.) Moench.) and pearl millet (Pennisetum americanum (L.) K. Schum) fodder crops in relation to soil moisture stress. Ph.D. thesis, Haryana Agricultural University, Hisar, Haryana, India. 109 pp.

Water use efficiency was found to increase with moisture stress because of high DM production. PAR absorptivity was observed under all the moisture regimes. The net P-rate and R-rate decreased with the increase in soil moisture stress. DM production increased with the decrease in soil moisture stress. Irrigation at ID/CPE ratio of 1.0 was optimum for attaining higher dry matter production, LAI, light interception and better recovery in the crops studied.

1323 BONMAN, J.M., PAISOOKSANTIVATANA, Y., and PITIPORNCHAI, P. 1983. Host range of Peronosclerospora sorghi in Thailand. Plant Disease 67(6): 630-632. 14 ref.

Twenty-five native grass species and 20 introduced forage grasses were tested for susceptibility to Peronosclerospora sorghi in Thailand. Sorghum nitidum, a native species was found susceptible to systemic infection.

1324 CAPINERA, J.L., RENAUD, A.R., and ROEHRIG, N.E. 1983. Chemical basis for host selection by Hemileuca oliviae: role of tannins in preference of C4 grasses. Journal of Chemical Ecology 9(10): 1425-1438. 41 ref.

When provided a choice between grass species with C3 or C4 photosynthetic pathways, larvae of range caterpillar Hemileuca oliviae Cockerell, selected C4 grasses including Sorghum sudanense and sorghum. The basis for host selection was examined by conducting analyses of moisture, crude protein, total available carbohydrate, sucrose, glucose, astringency, condensed tannin, silica, and pubescence of 14 grass species, and correlating host plant chemical characteristics with host preference. Most of the variation in host preference was explained by tannin characteristics (astringency

and condensed tannin); C3 grass species had significantly higher tannin levels than C4 species.

1325 DANGI, O.P., LODHI,G.P., NATH, R., and RAM, H. 1983. Genetics of forage characters in sorghum. Journal of Research, Haryana Agricultural University 13(3): 468-470. 5 ref.

Randomly selected 5 plants from parents and F1 and 25 plants from F2 and F3 were used to estimate the gene effects on plant height, leaf length, leaf breadth, no. of leaves, green fodder yield, and dry matter yield. The results indicated that the plant height, leaf breadth and number were controlled by additive type and green fodder yield and dry matter yield controlled more by dominance than additive.

1326 EFIMOV, E.T., and OSTAPENKO, A.P. 1983. Effect of fertilizers on yield of irrigated sorghum x sudan grass hybrid grown as a stubble crop. (Ru). Khimiya v Sel'skom Khozyaistve 21(10): 21-23. 3 ref.

NP and NPK fertilizers increased the fodder yield and fodder quality when grown after wheat.

1327 EL-HAROUN, M.S., SHABAN, S.A., and IBRAHIM, M.S. 1983. The response of three sorghum varieties (Sordan 77, NK 367 and NK 300) to potassium and nitrogen fertilizers. 1. Growth and chemical composition. Monoufeya Journal of Agricultural Research 7: 101-126. 16 ref. (Summary:Ar).

1328 EL-HAROUN, M.S., SHABAN, S.A., and IBRAHIM, M.S. 1983. The response of three sorghum varieties (Sordan 77, NK 367 and NK 300) to potassium and nitrogen fertilizers. 2. Fresh and dry forage yield. Monoufeya Journal of Agricultural Research 7: 141-155. 12 ref. (Summary:Ar).

1329 EL-NAGGAR, H.M.M. 1983. Response [yield, growth and composition] of forage sorghum [varieties] to some cultural treatments [sowing date, seeding rates, Egypt]. M.Sc. thesis, Zagazig University, Zagazig, Moshtohor, Egypt. 126 pp. (Summary:Ar).

1330 FEYT, H., JACQUIN, C., and LENOBLE, S. 1983. To fill the 'summer gap': forage sorghum. (Fr). Producteur Agricole Francais 59(327): 23-24.

1331 FORNEY, D.R., FOY, C.L., and WOLF, D.D. 1983. Suppression of weeds in no-till alfalfa by prior cropping of summer annual forages. Abstracts of 1983 Meeting of the Weed Science Society of America. pp. 65-66.

Sorghum x sudan grass hybrid and foxtail millet were found to limit weed populations in no-tillage lucerne sown immediately in their stubble.

1332 FREDERIKSEN, R.A., ROSENOW, D.T., REYES, L., and COLLINS, D. 1983. Registration of Tx2784 and Tx2785 sudangrass germplasm. Crop Science 23(2): 405.

Two lines resistant to downy mildew were released by the Texas Agricultural Experiment Station, USA in 1982. They are F8 lines from early generation material that was bulked and distributed previously as TAM Bk-49. Agronomic characteristics and downy mildew reaction of these lines are evaluated.

1333 FUENTES, F., and PUENTES, C. 1983. Some considerations on field experimental method. 4. A research study on border effect with elephant grass, sorghum and kenaf

for forage. (Es). Cultivos Tropicales 5(2): 363-372. 10 ref. (Summary:En).

1334 FULPAGARE, Y.G., DESHMUKH, A.P., CHAVAN, I.G., and DESALE, J.S. 1983. Prediction of in vitro dry matter digestibility of sorghum fodder from various chemical constituents. Journal of Maharashtra Agricultural Universities 8(1): 84. 4 ref.

Structural components like NDF, ADF, cellulose, hemicellulose, lignin and silica had highly significant but negative correlation with IVDMD. ADF having the highest but negative correlation could be considered for IVDMD estimation in the sorghum fodder crop. Prediction regression equation is given to predict IVDMD in the sorghum fodder with the help of cell wall constituents and crude protein.

1335 GABRIELSEN, B.C. 1983. Ensiling effects on herbage cell wall composition and enzymatic cellulose hydrolysis. Ph.D. thesis, Colorado State University, Fort Collins, Colorado, USA. 136 pp.

A kinetics study was conducted by ensiling forage sorghum for 10, 20, 30, 60, 90, 120, and 200 days as a part of the investigation on the effect of silage fermentation on subsequent enzymatic cellulose hydrolysis in herbage. 16% improvement in cellulose hydrolysis after 60 days of ensiling was associated with decreases in lignin and hemicellulose. Lower cellulose conversion rates following long-term ensiling resulted in alteration of the cell wall structure due to condensation reactions and cellulose recrystallization.

1336 GASPARI, F., and VECCHIETTINI, M. 1983. Influence of treatment with molasses and with urea in the ensiling of sorghum at the waxy grain stage and of sorghum stover. (It). Informatore Agrario 39(13): 25219-25222. 6 ref.

Stover and whole-crop of sorghum cv. harvested at the waxy grain stage were ensiled with urea and molasses. Molasses or urea had no significant effect on DM losses in both stover and whole-crop. In stover, CP content increased with urea and in the whole crop the tannin content increased during ensiling. Incorporation of urea and molasses improved the quality of silage.

1337 GILL, A.S., and PATIL, B.D. 1983. Agronomic work on forage sorghum at Indian Grassland and Fodder Research Institute, Jhansi-a review. Agricultural Reviews 4(2): 71-77. 30 ref.

The review gives useful information based on the agronomic studies carried out at Jhansi, India. For obtaining higher fodder yields, proper cultivation techniques and suitable varieties are identified.

1338 GILL, A.S., MINHAS, P.S., and PATIL, B.D. 1983. Fertilizer use in rainfed forages - response of annual and perennial forages to applied nitrogen. Forage Research 9(2): 141-146. 5 ref.

Results of field experiments revealed significant impact of nitrogen on fodder yield of all the forages, however, their response varied significantly in respect of applied N and the growth season. Perennials responded better to applied N than the annuals. At optimum N level, dry matter response per kg of fertilizer N was 0.77 and 0.69 q/ha for anjan and guinea grass, respectively. Corresponding figures for sorghum, pearl millet, maize and hill millet were 0.53, 0.45, 0.45 and 0.44 q/ha

in the same order. On the other hand, computed optimum dose of N for perennials (45 - 60 kg/ha) was much less than that for annual cereal fodders (100-262 kg/ha). Under rainfed conditions, fertilizer use can be made more profitable with its application to perennials than annual cereal fodder crops.

1339 GOLOVIN, V.P., and VIKTORENKO, V.D. 1983. Methods and results of breeding fodder crops at the Donetsk Experiment Station. (Ru). Nauchno-tekhnicheskii Byulleten' Vsesoyuznogo Selektsionno-geneticheskogo Instituta 3: 35-38.

Mass selection method was used to breed 4 varieties of sudangrass. Sudangrass varieties were also bred using experimental mutagenesis, polyploidy, distant hybridization and hybrid populations in addition to selection and breeding.

1340 GORZ, H.J., HASKING, F.A., and PEDERSEN, J.F. 1983. Combining ability effects for mineral elements in forage sorghum hybrids. Sorghum Newsleter 26: 44.

Forty-nine F1 hybrids of forage sorghum grown in Nebraska, USA were harvested, dried and ground. The samples were analysed for mineral content. Significant differences among hybrids were found only for K, Ca, and Zn among females for K and Ca, and among males for Ca and Cu. Significant specific combining ability effects were obtained for all elements except N, Si, K, Cu and Zn. From 66 phenotypic correlations calculated, 30 were statistically significant at the 0.05 probability level, and 11 of these had r values exceeding 0.50. All 30 significant r values were positive.

1341 GREWAL, R.P.S., LODHI, G.P., and BANGARWA, K.S. 1983. Correlation and path analysis in forage sorghum. Forage Research 9(2): 185-188. 7 ref.

Genotypic and phenotypic correlations revealed that all the characters except plant height showed highly significant positive correlations with both the green fodder and dry matter yields.

1342 GREWAL, R.P.S., LODHI, G.P., and PARODA, R.S. 1983. Genetic system for resistance to diseases in forage sorghum. Page 5 In National Seminar on Breeding Crop Plants for Resistance to Pests and Diseases, 25-27 May 1983, Coimbatore, Tamil Nadu, India. Coimbatore, Tamil Nadu, India: Tamil Nadu Agricultural University. (Abstract).

Ten crosses were evaluated for resistance to Ramulispora sorghicola. Additive and nonadditive gene action and a single recessive gene determined the resistance.

1343 GUPTA, B.K., SINGH, R.V., and MEHANDIRATTA, P.D. 1983. Comparative evaluation of varieties of sorghum and sudangrass for yield and quality of fodder. Journal of Research, Punjab Agricultural University 20(3): 319-326. 11 ref.

Twenty varieties of sorghum and sudangrass were evaluated. The green forage and dry matter yields of these varieties ranged from 363 to 583 q/ha and 78.5 to 129.5 q/ha respectively. Crude protein content varied between 7.0 and 11.9 per cent, while calculated protein yields varied between 2.91 and 8.46 q/ha. In vitro dry matter digestibility of these varieties varied from 50.2 to 59.4 and 50.7 to 60.5% in the first and second cuttings respectively. On the basis of yield and quality, the varieties HD-2, PC-21 and X-988 were superior to the rest.

1344 HASKINS, F.A., and GORZ, H.J. 1983. Apparent enhancement of the HCN-potencial of sorghum leaves by various treatments. Sorghum Newsletter 26: 101-102. 1 ref.

It is reported that increased HCN-p results when leaf tissues are disrupted. The apparent increases in spectrophotometrically determined HCN-p can result not only from freezing and thawing, but when field grown leaf tissue is heated at 70 deg C for 1 hr or ground in water at room temperature.

1345 HASSANEIN, A.M., MORSHED, G.A., EL-SONBATY, M.M., and HARFOUSH, M.A. 1983. Effect of seeding rates and sowing methods on forage yield of sorgho. Egyptian Society of Crop Science 2: 211-221. 11 ref. (Summary:Ar).

1346 HUKKERI, S.B., and SHUKLA, N.P. 1983. Effect of soil-moisture stress at different stages of growth on the fodder yield of 'MP Chari' sorghum. Indian Journal of Agricultual Sciences 53(1): 44-48. 8 ref.

In an experiment conducted in spring seasons of 1971 and 1972 on a loam soil of medium fertility at Jhansi, India the fodder yield and dry matter were reduced significantly by with-holding irrigations during any one or more stages of growth studied. The stage of vegetative lag was the most critical in its demand for assured water supply, whereas the other 2 stages could tolerate mild stress. For obtaining maximum production, the crop needed supply of water to maintain available soil water at or above 60% of availability in the surface depth of 60 cm root zone of the soil.

1347 IKEDE, K., NONOYAMA, Y., and ICHIKI, M. 1983. Growth injury of forage sorghum in the early stage. 2. Relationship between nutrient deficiency and growth injury. (Ja). Kyushu Agricultural Research 45: 81.

1348 INDIA:MAHATMA PHULE AGRICULTURAL UNIVERSITY. 1983. Forage sorghum. Page 39 In Annual report 1982-83. Rahuri, Maharashtra, India: Mahatma Phule Agricultural University.

The results of research on forage sorghum is covered in this report.

1349 ISAWA, K. 1983. Deterioration in the chemical composition and nutritive value of forage crops by foliar diseases. III. (Ja). Bulletin of the National Grassland Research Institute (Japan) 24:41-56. 8 ref. (Summary:En).

The disease severity of Helminthosporium spp. on the nutritive value of johnsongrass, sudangrass, and other forage crops was analysed. The soluble carbohydrates, crude protein, crude fat, digestible crude protein, total digestible nutrients and dry matter digestibility decreased with the increase in disease severity, while fibre and lignin contents increased.

1350 ISAWA, K. 1983. Deterioration in the chemical composition and nutritive value of forage crops by foliar diseases. VI. Chemical composition and nutritive value of Italian ryegrass infected with halo blight and sorghum leaves infected with bacterial stripe. (Ja). Bulletin of the National Grassland Research Institute (Japan) 26: 71-80. 11 ref. (Summary:En).

The leaves infected with Pseudomonas were classified into grades according to disease severity and the quality of the

leaves of each grade was determined. The protein, crude fat, soluble carbohydrate, and total digestible nutrient contents decreased, while lignin increased almost proportionally to the area covered with diseased lesions. Bacterial stripe did not affect dry matter and fibre contents and dry matter digestibility significantly.

1351 JONES, R.M., and READ, J.C. 1983. Production of forage sorghums under various management options at Stephenville. Progress Report, Texas Agricultural Experiment Station 4141: 72-79.

1352 KALMBACHER, R.S., WRIGHT, D.L., and MARTIN, F.G. 1983. Forage production from sugar sorghum, forage sorghum and sorghum x sudangrass hybrids at Ona ARC: 1982. Research Report, Agricultural Research Center, Jay, Florida no. RC-1983-3. 11 pp.

Ten sugar sorghum hybrids, 10 forage sorghums, 11 sorghum x sudangrass hybrids and 1 sudangrass were tested at Florida, USA. Significant differences were noticed in their yield.

1353 KAMEL, M.S., SHABANA, R., RADWAN, M.S., and GHABOUR, S.K. 1983. Use of cytoplasmic male sterility in forage sorghum for increasing forage yield. 1. Performance of F1 hybrids. Pages 223-229 In Proceedings of the First Conference of Agronomy, 10-12 September 1983, Cairo, Egypt. v.2. Cairo, Egypt: Egyptian Society of Crop Science. 9 ref. (Summary:Ar).

1354 KARWASRA, S.P.S., CHAUDHARY, S.L., and KHERA, A.P. 1983. Effect of P application on the forage quality of sorghum at various stages of crop growth. Forage Research 9(1): 57-60. 7 ref.

Pot culture studies were conducted to know the influence of varying P levels (0, 20 and 40 ppm) on the quality of forage sorghum grown on soils of low, medium and high P status. The protein and IVDMD content increased with P fertilization, whereas the HCN content tended to decrease. The ADF and NDF content of forage did not change significantly.

1355 KARWASRA, S.S., and LODHI, G.P. 1983. Disease evaluation in advanced forage sorghum entries. Sorghum Newsletter 26: 109.

Out of 13 early maturing and 13 medium maturing entries evaluated at Hisar, India for disease reaction, no entry was completely free from all diseases. S 297 demonstrated moderate resistance to most of the diseases evaluated.

1356 KAWABATA, T., and MIYAMATSU, K. 1983. Effects of application of dairy cow slurry manure on growth and mineral balance of forage crops [sorghum] in upland fields converted from paddy fields. (Ja). Bulletin of the Fukui Agricultural Experiment Station 20: 39-51. 16 ref. (Summary:En).

1357 KIM, D.A., CHUN, W.B., SEO, S., and KIM, H.K. 1983. Performance of sudangrass, sudangrass hybrids and sorghum-sudangrass hybrids for forage production. IV. Comparison of selected silage type hybrids. (Ko). Korean Journal of Animal Sciences 25(5): 451-455.

1358 KIM, D.A., SEO, S., CHUN, W.B., and KIM, H.K. 1983. Performance of sudangrass, sudangrass hybrids and sorghum-sudangrass hybrids for forage production. III. Comparison of selected soiling type hybrids. (Ko). Korean Journal of Animal Sciences 25(5): 445-450.

1359 KOMOTO, Y., and HORI, M. 1983. Factors affecting development of Curvularia leaf spot of sudangrass. (Ja). Bulletin of the Chugoku National Agricultural Experiment Station, Series E 20: 15-23. 5 ref. (Summary:En).

Seed transmission of Curvularia was the most important source of infection in sudangrass. Diseased residues of sudangrass were also a source of primary infection. The rate of disease progress depended on susceptibility of the cv. Lesion enlargement and disease progress were related to the timing of flag leaf emergence.

1360 KOUNO K., ANDO, T., AKAGI, E., and OGATA, S. 1983. Studies on dry matter and protein production by forage crops. 2. Effects of plant density and nitrogen application rate on dry matter and protein production by sorghum. (Ja). Japanese Journal of Soil Science and Plant Nutrition 54(6): 473-478. 13 ref.

1361 KOUNO, K. 1983. Studies on the protein production of forage crops. (Ja). Journal of the Faculty of Applied Biological Science, Hiroshima University 22(1): 69-134. 173 ref. (Summary:En).

The conditions required to maximize sorghum leaf protein production were increased leaf-stem ratio, leaf thickness, nitrogen uptake ability and proportion of chloroplastic and cytoplasmic protein to total leaf protein.

1362 LAZANYI, J., and PAPP, S. 1983. Effect of reciprocal crosses in three-way cross sorghum x sudangrass hybrids. Sorghum Newsletter 26: 4-5. 2 ref.

The phenological, morphological, and yield parameters of the hybrids and of the Sf, restorer line were determined by pot trials. The 3-way cross hybrids yielded more than the single-cross hybrids. This protein content, however, was lower. The 3-way hybrids, where CSA as cytoplasmic male-sterile line was present, did not yield significantly more in comparison with these hybrids where CSB as a maintainer line was present. In case of 3-way cross sorghum x sudangrass hybrids significant differences were found between the reciprocal crosses over 2 testing years and 4 replications.

1363 LAZAR, L. 1983. Results of fodder sorghum variety trials 1982. (Hu). Vetomagtermelteto es Ertekesito Vallalat. 26 pp.

1364 LONG, F.L., and ELKINS, C.B. 1983. The influence of roots on nutrient leaching and uptake. Special Publication, Georgia Agricultural Experiment Stations 23: 335-352. 11 ref.

Roots of sorghum x sudan grass hybrids were found more efficient than roots of maize in N uptake and reducing the leaching of minerals.

1365 MANDAL, B.K., and RAO, M.V. 1983. Effect of cattleshed washings on the yield of some fodder crops. Indian Journal of Agronomy 28(4): 475-476. 1 ref.

There was significant increase in forage yields in sorghum and other fodder crops with the application of cattleshed washing without any addition of inorganic fertilizers.

1366 MANDAL, B.K., and VAMADEVAN, V.K. 1983. Relative yield potentiality of some forage crops under Cuttack conditions. Indian Journal of Agronomy 28(4): 471-472. 2 ref.

The result indicated that sowing of fodder crops on ridges was

superior to sowing in flat beds in the rainy season. This was possibly due to the additional advantage of better drainage available with sowing on the ridges as compared to flat beds. Among the different fodder crops tried, sorghum var. M P Chari and Dinanath grass var. T 15 gave the highest green fodder yield; this was closely followed by sorghum var. Salboni and Dinanath grass var. T 22.

1367 MARCU, S. 1983. The importance of summer forage mixtures followed by successive crops. (Ro). Revista de Cresterea Animalelor 3: 22-27.

Maize and a spring mixture of oats and peas were grown alone or followed by forage maize, sudangrass or sorghum x sudangrass. DM yield of sudangrass and sorghum x sudangrass increased with N application. The highest yield of 16.06 t/ha was obtained with the spring mixture sorghum x sudangrass.

1368 MARTINEZ, H.L. 1983. Study of densities of fodder sorghum intercropped in Bermuda coastcross-1 areas. (Es). Pastos y Forrajes 6(2): 209-220. 14 ref. (Summary:En).

1369 MASON, W.K., and PRITCHARD, K.E. 1983. Summer grass crops - summary for Victoria. Grassland Society of Victoria Annual Conference 24: 68-74.

1370 MISLEVY, P., OVERMAN, A.J., and DANTZMAN, C.L. 1983. Seasonal forage yield and quality as affected by crop sequence. Proceedings of the Soil and Crop Science Society of Florida 42: 99-103. 8 ref.

Twelve combinations of crop sequences were tested in Florida, USA including sorghum x sudan grass. Maize outyielded sorghum in the 1st crop of the sequence, while forage DM yields were lower than the 1st crop. Sequences of maize followed by 2 crops of sorghum x sudan grass or forage sorghum produced highest DM and digestible forage yields.

1371 MUCHA, S., and BRZOSKA, P. 1983. Preliminary studies of the yield and chemical composition of American sorghum-sudan-grass hybrids cultivated for silage in Poland in 1979. (Pl). Roczniki Naukowe Zootechniki 10(1): 113-124. 20 ref. (Summaries:De, En, Ru).

The data on yield and composition of 5 American sorghum-sudangrass hybrids tested at 6 experimental stations in Poland are presented.

1372 NANDRA, K.S., TIWANA, M.S., and CHOPRA, A.K. 1983. Chemical composition, in vitro dry matter digestibility and yield of sorghum fodder at different stages of growth. Journal of Research, Punjab Agricultural University 20(3): 390-393. 10 ref.

The changes in the cell wall constituents of fodder sorghum at different stages of growth and determination of optimum harvesting stage based on IVDMD and dry matter yield was studied. The recommended optimum stage of harvesting the sorghum fodder is between 65 to 75 days of sowing, at the earing stage, when it is high in nutritive value to animals.

1373 NICHOLS, R.L., and ALLILNSON, D.L. 1983. Effects of litter-free poultry manure on nitrogen mineralization and yields of sudangrass and sorghum x sudangrass cultivars. Special Publication, Georgia Agricultural Experiment Stations 23: 389-406. 31 ref.

Mean dry matter yield of cultivar

revealed that nitrogen recovery was less efficient from a litter free poultry manure than from NPK fertilizers.

1374 NONOYAMA, Y., ICHIKI, M., and IKEDA, K. 1983. Growth injury of forage sorghum in the early stage. 1. Effect of nitrogen nutrient. (Ja). Kyushu Agricultural Research 45: 80.

1375 OSUNA, J.A., ANDRADE, V.M. DE M., ANDRADE, P. DE, and DENARI, M.J. 1983. Evaluation of fodder cultivars of Sorghum bicolor (L.) Moench in terms of yield and some physical and chemical characteristics of the silage. (Pt). Cientifica 11(1): 71-78. 8 ref. (Summary:En).

Hybrid Sudan and Sarti were of short and long duration, respectively. Panicle:entire plant ratio was inversely proportional to DM production. Values for ADF, NDF and cellulose content of silage were 49.45, 67.6 and 34.12% for Sarti, 41.61, 76.86 and 39.77% for Hybrid Sudan and 40.76, 65.66 and 33.12% for Conti, respectively. Silage yields were 42.22, 44.49 and 43.13 t/ha in Sarti, Hybrid Sudan and Conti, respectively. Culm strength was low in all cultivars.

1376 PATHAK, H., and SANGHI, A.K. 1983. Stability analysis of certain yield components in multicut types of forage sorghum. Madras Agricultural Journal 70(5): 284-288. 1 ref.

Ten forage sorghum varieties were evaluated for stability of performance for plant height, stem girth, tillers/plant, leaves/plant, leaf length in 5 environments in 2 cuts at Gujarat, India during 1980-81. Genotypes and environments were highly significant for all the characters. Characters like plant height tillers/plant, leaves/plant and leaf breadth were unstable in all the varieties. However, varieties like M.P. Chari in first cut for stem girth and leaf length and IS 3211 in second cut for stem girth showed average stability. Genotype IS 3201 showed the maximum plant height, stem girth and leaf length and was stable. SSG 59-3 possessed higher tillers and the highest leaves/plant. Stability parameters showed association between X and b for plant height, X and S2d for leaves/plant and X and b for leaf breadth. All three parameters were significantly associated for tillers/plant.

1377 PEDERSEN, J.F., HASKINS, F.A., and GORZ, H.J. 1983. Quality traits in forage sorghum harvested at early head emergence and at physiological maturity. Crop Science 23(3): 594-596. 9 ref.

Percent dry matter, crude protein, and in vitro dry matter disappearance of leaf, stem, and whole plant samples were determined for field-grown samples harvested on three different days during early head emergence (EHE) and once during physiological maturity (PM) for each cultivar. Orthogonal comparisons between EHE and PM sampling stages and among the EHE samples were made. Results of the 2-year study indicated that statistically significant differences existed among EHE samples and between EHE ad PM samples. However, differences among EHE samples were generally much smaller than those between EHE and PM samples and may be of little importance for some applications.

1378 PEDERSEN, J.F., HASKINS, F.A., GORZ, H.J., and BRITTON, R. 1983. Variability for traits used to estimate silage quality in forage sorghum hybrids. Crop Science 23(2): 376-379. 25 ref.

The variation among 49 F1 forage sorghum hybrids from a 7 x 7 cross-classified design was explored for the following silage traits: dry matter (DM), crude protein, in vitro dry matter disappearance (IVDMD), neutral detergent fiber, acid detergent fiber, acid detergent lignin, ammonia, lactate, and Brix of the juice from fresh stalks. Wider ranges generally were found for male than for female parental means. Means for most traits were significantly different among entries. Significant differences among hybrid means over males and over females were found for only DM, IVDMD, and Brix. Genetic ratios calculated from the mean squares indicated that general combining ability was important for DM, IVDMD, and Brix. Simple correlation coefficients between traits measured on silage and on fresh-dried samples from the same hybrids were all significant. Initial selection for traits used to estimate quality in fresh-dried samples appears to be the best approach for improving the quality of forage sorghum silage.

1379 POSLER, G.L., BOLSEN, K.K., and NUWANYAKPA, M.Y. 1983. Summer annual forages [sorghum] for livestock production in Kansas. Bulletin, Kansas Agricultural Experiment Station no. 642. 19 pp. 13 ref.

1380 RAJAGOPAL, D. 1983. Effect of termite mound soil on plant growth. Tropical Pest Management 29(2): 194-195.

The effect of mound soil on the yield of fodder sorghum was studied at Bangalore, India. More luxuriant growth and a higher yield of fodder sorghum were obtained on plots treated with mound soil.

1381 RENEAU, R.B., JR., JONES, G.D., and FRIEDERICKS, J.B. 1983. Effect of P and K on yield and chemical composition of forage sorghum. Agronomy Journal 75(1): 5-8. 20 ref.

These studies were conducted on a clay soil. Potassium application increased yields only in years with less than optimum moisture conditions and then only when P was applied. When no P was applied, yields decreased with increased K application. Phosphorus increased yields in all 3 yrs. studied. In years with less than optimum moisture conditions, application of K increased yields at the higher P levels. Tissue K concentrations increased with K application while Ca and Mg concentrations decreased with increased K application while Ca and Mg concentrations decreased with increased K application. However, when P was applied Ca and Mg concentration increased. In the absence of applied P, the decrease in Ca and Mg concentration was related to competition with K for uptake. This competition may be responsible for reduced yields when K application was increased in the absence of applied P. A linear relationship between yield and Mg concentration in the tissue was present.

1382 RITTER, W. 1983. Fodder production in the subtropicas - an example of a project from Brazil. (De). Entwicklung und Laendlicher Raum 17(5): 12-14. 4 ref.

The possibility of improving fodder supplies by growing maize, sorghum or pearl millet for silage is discussed.

1383 RODRIGUEZ GUERRERO, H., and LOPEZ CISNEROS, M. 1983. Technology for dry silage production with dried forage. (Es). Ciencia y Tecnica en la Agricultura, Pastos y Forrajes (Cuba) 6(1): 53-62. 19 ref.

(Summary:En).

1384 ROMANOV, G.A., and TRISHKIN, S.A. 1983. New cultivars of fodder crops for commercial cultivation. (Ru). Selektsiya i Semenovodstvo 4: 29-31.

Information on new cv. and hybrids of sorghum, sorghum-sudan grass hybrid and other fodder crops adapted to different regions of the USSR for fodder production is given.

1385 SABADEANU, P., KRAUSS, M., and VEVERCA, D. 1983. Determination of fodder plant yields in the field. (Ro). Revista de Cresterea Animalelor 33(8): 1-7.

Fresh weight yield of sudan grass alone or in a mixture with hybrid sorghum or fodder maize was determined. Hay yields following successive cuts at 6-8 week intervals were calculated from fresh weight yields using a coefficient of transformation based on m.c. at harvest and the method of drying.

1386 SAIGA, S. 1983. New cultivars of grasses and legumes registered under the seeds and seedlings law. (Ja). Journal of Japanese Society of Grassland Science 29(3): 263-265.

Description of sorghum cv. Suzuho is given.

1387 SAMUELS, G., ALEXANDER, A.G., RIOS, C., and GARCIA, M. 1983. Tropical grasses as a renewable energy source. Proceedings of the Soil and Crop Science Society of Florida 42: 70-72. 6 ref.

Tropical grasses from Saccharum and allied genera were evaluated in Puerto Rico for intensively produced renewable energy sources of boiler fuel and alcohol. Three categories of tropical grasses emerged based on the time required to maximize their DM yields: short rotation (2 to 3 months) with 'Sordan 70A' (a sorghum x sudan grass hybrid), intermediate rotation with napier grass and long rotation with sugarcane. Maximum total DM yields/ha were 147 from Sordan 70A harvested at 14-wk. intervals.

1388 SCHWAB, S.M., MENGE, J.A., and LEONARD, R.T. 1983. Comparison of stages of vesicular-arbuscular mycorrhiza formation in sudangrass grown at two levels of phosphorus nutrition. American Journal of Botany 70(8): 1225-1232.

Several stages of infection process by the vesicular-arbuscular mycorrhizal fungus, Glomus fasciculatus, were compared in roots of sudangrass grown in phosphorus-deficient or phosphorus-amended soil. Phosphorus nutrition of the host did not affect prepenetration stages of mycorrhiza formation by G. fasciculatus. External hyphal growth following initial penetration of the host was reduced with phosphorus amendment. The subsequent ability of the fungus to form secondary penetrations is thus decreased, ultimately resulting in the overall decrease in mycorrhiza formation commonly observed in plants receiving high levels of phosphorus.

1389 SCHWAB, S.M., MENGE, J.A., and LEONARD, R.T. 1983. Quantitative and qualitative effects of phosphorus on extracts and exudates of sudangrass roots in relation to vesicular-arbuscular mycorrhiza formation. Plant Physiology 73(3): 761-765. 32 ref.

A comparison was made of water-soluble root exudates and extracts of sudangrass grown under two levels of P nutrition.

Comparisons of the rate of leakage of compounds from roots with the growth rate of vesicular-arbuscular mycorrhizal fungi suggest that the fungus must either be capable of using a variety of organic substrates for growth, or be capable of inducing a much higher rate of movement of specific organic compounds across root cell membranes than occurs through passive exudation as measured in this study.

1390 SERENA, D.E. 1983. Forage sorghum: (sorghum) experiences in the Depresion del Salado (Buenos Aires, Argentina). Results obtained from two-years measurements in an agricultural enterprise. (Es). Gaceta Agronomica 3(12): 189-204.

1391 SHABANA, R., KAMEL, M.S., RADWAN, M.S., and GHAPOUR, S.K. 1983. Use of cytoplasmic male sterility in forage sorghum for increasing forage yield. 2. Heterosis and its relation with characters of parental types. Pages 231-281 In Proceedings of the First Conference of Agronomy, 10-12 September 1983, Cairo, Egypt. v. 2. Cairo, Egypt: Egyptian Society of Crop Science. 13 ref. (Summary:Ar).

1392 SHARMA, S.K. 1983. Field potential of sudan grass (Sorghum sudanensis Stapf) and alfalfa (Medicago sativa L.) varieties under saline conditions of Yemen Arab Republic. Indian Journal of Agronomy 28(3): 303-304.

Three varieties of sudan grass (Kenyan Hybrid, Kenyan Selection and local) were evaluated for fodder yield. Kenyan varieties produced more green fodder (22-25 t/ha) and exhibited higher tillering ability (3 tillers/plant) than the local variety.

1393 SHEPHERD, A. 1983. Capitalist agriculture in the Sudan's dura prairies. Development and Change 14(2): 297-321.

1394 SHOVELTON, J.B. 1983. Responses by fodder crops to irrigation. Grassland Society of Victoria Annual Conference 24: 63-67.

1395 SINGH, S.P., and LODHI, G.P. 1983. Cultivars of forage sorghums screened for resistance to shootfly (Atherigona soccata Rondani). Sorghum Newsletter 26: 72.

Four entries, IS 2123, IS 5469, IS 5470 and IS 8315, showed less than 5% dead heart formation. 3 lines, G 119, SAD 195 and IS 4496 had dead heart formation of over 60%. The corresponding values for the two checks, JS 20 and HC 136, were 32.1 and 43.3%, respectively.

1396 SINGH, V., SINGH, D., and SHINDE, D.A. 1983. S and P fertilization reduces HCN content of sorghum. Sulphur in Agriculture 7: 12-14. 9 ref.

The experiment was carried out to investigate the suitable combinations of S and P to reduce the HCN content in forage sorghum. S and P fertilization increased the forage yield and the protein, sugar and fat contents. A combined application of 100 kg S/ha and 50 kg P205/ha was most suitable for the production of forage sorghum with a safe HCN content.

1397 SINGH, V., SINGH, D., SHINDE, D.A., and NAMDEO, K.N. 1983. HCN content of varieties of fodder sorghum in relation to yield and nutritional value. Indian Journal of Agricultural Sciences 53(6): 431-434. 10 ref.

Five varieties of fodder sorghum were studied for the fluctuation in

the amount of prussic acid at different growth stages, and the crude fibre, crude protein, sugar, fat and mineral constituents at harvest stage. 'Jawahar 6' gave the highest green-fodder yield, medium dry-matter percentage, and the lowest amount of hydrocyanic acid at every stage of growth. It proved fairly safe for feeding animals, whereas other varieties contained toxic amounts of HCN. 'Jawahar 6' gave the lowest amount of crude fibre, the highest amounts of sugar, protein, fat, CaO, P205, MgO, K20, Na20 and S. A high positive correlation was noticed between green-fodder yield and its constituents, but negative correlation was observed with HCN and crude fibre.

1398 SMITH, D.H., LINDEN, J.C., and VILLET, R.H. 1983. Fermentation potential of vegetation from various herbaceous plants following enzymatic hydrolysis. Pages 149-152 In Proceedings of the Sixteenth International Grassland Congress, 15-24 June 1981, Lexington, Kentucky, USA (Smith, J.A., and Hays, V.W., eds.). Boulder, Colorado, USA: Westview Press. 6 ref.

The fermentation potential of various herbaceous species following enzymatic hydrolysis was determined. Preliminary evidence with sorghum suggested that enzymatic cellulose hydrolysis could be improved either by using brown-midrib (bmr) mutants or by ensiling forage materials. The rates of cellulose conversion to glucose of bmr mutants were not always superior to those of their normal counterparts even though the lignin content of these mutants was usually lower. Averages from bmr and normal sorghum harvested on 2 different dates indicated that from 29.4% to 36.5% of the total dry matter could be enzymatically converted to fermentable hexoses. The cellulose conversion rates for the grasses ranged from 16.7% for forage sorghum harvested during seed filling. Variability associated with species, varieties, stage of maturity, and ensiling produced substantial variation in enzymatic cellulose hydrolysis of herbaceous plants.

1399 STOOP, W.A. 1983. Phosphate adsorption mechanisms in oxidic soils: implications for P-availability to plants. Geoderma 31(1): 57-69. 22 ref.

Phosphate solubility in the oxidic soils depended mainly on salt concentration and cation valency. It was decreased by the accompanying cation according to: k < Mg < Ca. This cation effect on P solubility decreased with increasing contents of layer silicate clay minerals and/or increasing base saturation of the soil. Consequently, it was almost absent in the Haplustoll which contains montmorillonite and kaolinte. The P solubility in all four soils increased greatly when the pH was raised with NaOH. When Ca (OH)2 was used, however, this effect was almost eliminated due to the action of Ca ions. In a subsequent pot experiment evidence was obtained on the negative effect of the Ca ion on P uptake by sudangrass from the Gibbsihumox and Eutrustox.

1400 TABOSA, J.N., LIRA, M. DE A., MACIEL, G.A., ARAUJO, M.R.A., ARCOVERDE, A.S.S., and DE FREITAS, E.V. 1983. Preliminary forage sorghum trials, Pernambuco, Brazil, 1982. Sorghum Newsletter 26: 2.

The trials were carried out on 45 F7 lines at 4 locations of semi-arid Pernambuco, Brazil. The cultivars were grouped into 5 groups and two checks in a

randomized block. The new lines yielded more than the checks. The dry matter yields of the most productive lines are presented in a tabular form.

1401 TANEJA, K.D., LUTHRA, Y.P., and LODHI, G.P. 1983. Effect of irrigation and nitrogen levels on HCN content and forage yield of sorghum. Forage Research 9(2): 173-174. 6 ref.

A field experiment having treatments involving 4 varieties of sorghum, 3 irrigation levels and 4 levels of N was conducted in Hisar, India. Higher yields were obtained by the application of 3 and 4 post irrigations over 2 post irrigation. The HCN content decreased with the increase in irrigation levels. N application increased forage yield. With the increase in the level of N, the HCN content increased suggesting that N played a dominant role in HCN synthesis.

1402 TARUMOTO, I., and MASAOKA, Y. 1983. A simple method of evaluating forage digestibility and its application to sorghum breeding. Pages 146-149 In Proceedings of the Fourteenth International Grassland Congress, 15-24 June 1981, Lexington, Kentucky, USA (Smith, J.A., and Hays, V.W., eds.). Boulder, Colorado, USA: Westview Press. 10 ref.

The applicability of the one-stage simple cellulose digestion (SCD) method to the evaluation of digestibility of various sorghums was examined. The SCD method was found applicable to the breeding program of improving forage quality in sorghum. Application of the SCD method to evaluation of digestibility both of collected cultivars in the selection of recombinant parents and of the breeding lines in early generations is considered to be most effective.

1403 TEMERAK, S.A. 1983. Studies on Pediobius bruchicida (Rond.) (Hym., Eulophidae) a hyperparasitoid of Sesamia cretica Led. (Lep., Noctuidae). Zeitschrift fuer Angewandte Entomologie 95(3): 267-272. 6 ref.

Parasitism of P. bruchicida was estimated by 3 methods, in the field. Pediobius females were observed to have high searching ability to forage sorghum stalks and attack Bracon cocoons even when they were inside tunnels of the phytophagous borer larvae. The emergence of Bracon individuals occurred significantly earlier than of Pediobius. Time-distance between emergence increased (from 10-18 days) as the time of Pediobius exposure was delayed. Average total developmental period was 14 and 21 for Bracon and Pediobius, respectively. Pediobius females attacked new as well as old cocoons of Bracon and the development rate of progeny was the same. When reared in the laboratory, the adults of primary parasitoid altered their color from black to yellow. However, Pediobius adults retained the initial colour (black). The eulophid wasp proved to be solitary and endopupal parasitoid of the braconid, B. brevicornis.

1404 TOMER, P.S., MARTUR, M.D., GANGULY, T.K., HARIKA, A.S., and SAIRAM, R.K. 1983. Agronomy of forage sorghum under high and low input conditions - a review. Agricultural Reviews 4(1): 25-28. 23 ref.

The work on forage sorghum remained neglected and little information is available on agronomy of this crop. Differential responses to nitrogen have been obtained depending upon soil, climate and irrigation. The

responses to 24-50 kg N/ha under dryland conditions, 30-60 kg N/ha under irrigated conditions and 150-190 kg N/ha at Pantnagar and Jabalpur, India have been noted. The crop did not respond to phosphorus application. Application of 0.25 kg atrazine ai/ha proved effective. It is felt that there is need to workout complete agronomy on this crop particularly under variable crop sequences. However, some efforts have been made in this direction at NDRI, Karnal and HAU, Hisar, India.

1405 TORRES-CARDONA, S., SOTOMAYOR-RIOS, A., and TELEK, L. 1983. Agronomic performance and hydrocyanic acid potential (HCN-p) of single and three-way sorghum-forage hybrids and DeKalb hybrid SX-127. Journal of Agriculture of University of Puerto Rico 67(1): 39-49. 19 ref.

Eleven sorghum forage entries, including 5 single crosses 5 three-way hybrids and Dekalb hybrid SX-17 were evaluated for yield of green forage (GF), yield of dry forage (DF), crude protein (CP) content, CP yield, height, leaf area, number of tillers, leaf-stem ratio and hydrocyanic acid potential (HCN-p) at Isabela, Puerto Rico. Single crosses were on the average superior to three-way hybrids in yield and most of the other characteristics studied. Three-way hybrids had a lower average HCN content than single crosses. These values are slightly higher than the 200 p/m level at which HCN toxicity may begin to affect animals. Results indicate that any of the three top hybrids of this study would be an excellent choice for farmers desiring high forage production under irrigation in Puerto Rico.

1406 TYAGI, I.D., AGNIHOTRI, G.S., and MISHRA, R. 1983. Component analysis in forage sorghum. Page 645 In Abstracts of contributed papers of the Fifteenth International Congress of Genetics, 12-21 December 1983, New Delhi, India. pt. 2. New Delhi, India: Oxford and IBH Publishing Co.

Twenty genotypes of sorghum were evaluated for 8 component characters. Yield was positively associated with all the characters. Dry matter, plant height and stem girth had direct effect on green fodder yield. All characters except stem girth had direct effect on dry matter yield.

1407 VAKHNENKO, V.V. 1983. Varieties and hybrids of grain sorghum promising for silage production in West Kazakhstan. (Ru). Biulletin', Vsesoiuznyi Institut Rastenievodstva 128: 28-29.

1408 WALTON, M.F., HASKINS, F.A., and GORZ, H.J. 1983. False positive results in the vanillin-HCl assay of tannins in sorghum forage. Crop Science 23(2): 197-200. 14 ref.

When vanillin-HCl procedures were used for sorghum forage it was found that false positive reactions resulted, that is, red colour developed due to leucoanthocyanidine in the presence of HCl with or without vanillin. A "chloroform-HCl" procedure was developed for measuring leucoanthocyanidins in sorghum forage. The procedure avoids interference by chlorophyll or other chloroform-soluble constituents. With vanillin added to the solution, this procedure should also be useful for the assay of condensed proanthocyanidins (tannins).

1409 WHEELER, J.L., DALE, A.B., and HEDGES, D.A. 1983. Sulphur and sodium content of forage sorghum in New South Wales. Tropical Grasslands 17(1): 20-25.

12 ref.

About 90% of the samples analysed contained <0.06% Na, the min. recommended level for animal production, while about 25% of samples contained insufficient S. Salt licks containing 5% S were recommended for routine use with animals grazing forage sorghum.

1410 YOUNIS, A.A. 1983. Genetical and cytological studies on interspecific hybrids in some forage sorghum. Ph.D. thesis, Cairo University, Cairo, Egypt. 117 pp. (Summary:Ar).

1411 YUNG LARRE, C.E. 1983. Sorghum, supplementary forage resource for summer in the coast dry area of La Union Village, 10 region [Chile]. (Es). Thesis, Universidad de Chile, Santiago, Chile. 120 pp. 38 ref. (Summary:En).

1412 ZAPATA ARBELAEZ, J.O. 1983. Effect of various concentrations of eight nitrogen sources and three carbohydrates on in vitro digestion of low quality roughages. Ph.D. thesis, New Mexico State University, Las Cruces, New Mexico, USA. 88 pp.

1413 ZUBIZARRETA, J. 1983. Forage reserves [sorghum]. (Es). Cuaderno de Actualizacion Tecnica, Consorcios Regionales de Experimentacion Agricola (Argentina) 33: 53-63.

SWEET SORGHUM

1414 ANDERSON, D.L., and CHERRY, R.H. 1983. Fall armyworm (Lepidoptera:Noctuidae) damage to fifteen varieties of sorghum. Florida Entomologist 66(4): 506-510. 7 ref. (Summary:Es).

Feeding damage by fall armyworm [Spodoptera frugiperda] among 15 sweet sorghum varieties and correlations of this damage with 5 plant variables were measured. The population distribution of the insect on plants of one variety was also measured. Significant differences in feeding damage among the varieties were noticed. Dry fraction, height, and maturity were significantly correlated with feeding damage among the sorghum varieties. Brix and sucrose did not show significant correlation with feeding damage. The population distribution of the larvae on sorghum plants differed significantly from the Poisson distribution in the direction of uniformity.

1415 BAPAT, D.R., SHINDE, M.D., PADHYE, A.P., and DHANDE, P.H. 1983. Screening of sweet sorghum varieties. Sorghum Newsletter 26: 28.

About 100 lines were screened at AICSIP, Rahuri, India for their T.S.S. and fresh fodder yield at different stages. T.S.S. increased from flowering to maturity stage in most of the entries. 5 lines showed consistently high T.S.S. at both the milk and maturity stage. It was also observed that apart from sweetness, some entries also showed remarkably high fodder yields which could be utilized as fodder varieties after relevant testing.

1416 BENDER, D.A., VANDERLIP, R.L., SMITH, G.A., BAGBY, M.O., and PEART, R.M. 1983. Simulating the growth and development of sweet sorghum. Paper, American Society of Agricultural Engineers no. 83-3022. 12 pp. 16 ref.

Growth and development were modelled by modifying an existing sorghum growth model. Phenological

predictions were in good agreement with field data, but total dry matter predictions were consistently low. Dry matter partitioning between plant parts was calibrated with one set of field data and tested with another data set.

1417 BROADHEAD, D.M., and ZUMMO, N. 1983. Registration of crop cultivars. M 81E sweet sorghum. Crop Science 23(5): 1013.

M 81E sweet sorghum (Reg. no. 121), a late maturing cultivar developed for syrup and fermentable sugar production and adapted to southeastern USA is described.

1418 BRYAN, W.L. 1983. Alternate extraction and fermentation processes for sweet sorghum. Pages 147-150 In Third Annual Solar and Biomass Workshop, 26-28 April 1983, Atlanta, Georgia, USA. Washington, D.C., USA: United States Department of Agriculture.

A practical method for [small-scale production of ethanol] is proposed in which the sugar in chopped sweet sorghum or in sweet sorghum bagasse is converted into ethanol by solid-phase fermentation, part of the fermented juice is removed in a screw press and the remaining ethanol is recovered by vaporization from the bagasse. Solid-phase fermentations of chopped sweet sorghum (14.2% hexose) and of bagasse (13.2% hexose) were conducted adiabatically to simulate thermal conditions in a continuous solid-phase fermentor. Temperature of chopped sorghum increased to 33.8 deg C (88% of theoretical temperature rise) within 45 hours and temperature of bagasse increased to 36.0 deg C (92% of theoretical) within 42 hours. Sugar conversions calculated from weight loss during fermentations were 92% for chopped sorghum and 98% for bagasse.

1419 BRYAN, W.L., MONROE, G.E., and CAUSSANEL, P.M. 1983. Sweet sorghum extraction and fermentation systems for ethanol production. Paper, American Society of Agricultural Engineers no. 83-3572.

1420 CARLSON, K.D., and JASBERG, B.K. 1983. Sweet sorghum grown on sludge-amended stripmine soils. Sorghum Newsletter 26: 68.

Sweet sorghum responded favourably to the sludge treatment as evidenced by earlier emergence of seedlings, higher and more uniform plant populations and earlier maturation of stalks compared to control plants. Fresh or dry biomass yields were higher on amended plots.

1421 CARLSON, K.D., CARR, M.E., CUNNINGHAM, R.L., BAGBY, M.O., and PALMER, D.M. 1983. Lignin analyses on sweet sorghum samples. Transactions of the Illinois State Academy of Science 76(3-4): 265-269. 5 ref.

A comparison of lignin contents determined by two methods on two replicated samples receiving one of 3 pretreatments is reported for freeze-dried sweet sorghum. The pretreatments were: extraction with 95% ethanol/benzene (1:2, v/v); extraction with 80% aqueous ethanol; and no extraction prior to lignin analysis by ultraviolet spectrophotometric (UV) or sulfuric acid methods. Multiway analysis of variance was used to examine results, and highly significant variation among treatments and methods was observed. Differences in lignin content between samples and between methods were greatest when the sweet sorghum was not extracted prior to analysis. These differences were reduced when samples were first extracted with

alcohol/benzene. Differences between samples and between methods vanished when an 80% aqueous ethanol extraction preceded lignin analysis. A pretreatment consisting of 80% aqueous ethanol extraction appears to provide a suitable substrate for either method of lignin analysis on sweet sorghum.

1422 CARLSON, K.D., CUNNINGHAM, R.L., and HERMAN, A.I. 1983. Sweet sorghum grown on sludge-amended stripmine soil: a preliminary look at yields, composition, and ethanol production. Transactions of the Illinois State Academy of Science 76(1-2): 111-122. 19 ref.

Mean sucrose content of whole-stalk dry solids was 35%. Juice yields of 50-68% from fresh stalks were obtained, and the 14% total sugar concentration in the juice was readily fermented by Saccharomyces cerevisiae to ethanol in 72% yield. Since sucrose content of the bagasse dry solids was 24%, additional fermentable substrate can be obtained by water extraction. Without additional pretreatment, about 13% of the cellulose in the fresh bagasse was converted to glucose by standard cellulase treatment.

1423 CAVAZZA, L., VENTURI, G., and AMADUCCI, M.T. 1983. Technical possibilities for ethanol crops in Italy. (It). Rivista di Agronomia 17(1, suppl.): 238-260. 59 ref. (Summary:En).

The possibilities of growing sugarbeet, potato, sweet sorghum and vines for the production of ethanol for use as a fuel in Italy are reviewed. Modifications in agronomic practices, the chemical and physical properties of the crop and choice of cv. are discussed, and economic data are presented. Expansion in crop area is reviewed in the light of soil, climatic and irrigation requirements and the interaction with the areas of other crops. The dangers of monoculture are underlined.

1424 CHIELLE, Z.G., SOARES, G.J.S., and CHIELLE, M.C.P. 1983. Study of resprouting in sugar sorghum (Sorghum bicolor) in sowing period trial. (Rio Grande do Sul, Brazil). (Pt). Pages 172-176 In Culturas energeticas: resultados experimentais 1982/83. Porto Alegre, RS, Brazil: Instituto de Pesquisas Agronomicas.

1425 CHIELLE, Z.G., SOARES, G.J.S., SUTILI, V.R., and CHIELLE, M.C.P. 1983. Sowing periods in sugar sorghum (Sorghum bicolor). (Pt). Pages 166-171 In Culturas energeticas: resultados experimentais 1982/83. Porto Alegre, RS, Brazil: Instituto de Pesquisas Agronomicas.

1426 CLARKE, S.J. 1983. Developments in analytical methods. Jamaican Association of Sugar Technologists Journal 41: 281-283.

It is observed that the pits:fibre ratio in sweet sorghum or sugarcane can be determined by disintegration of a sample and washing-out the pits to estimate the millability.

1427 CLEGG, M.D., MARANVILLE, J.W., and OLSON, R.A. 1983. Sweet sorghum. Publication, Great Plains Agricultural Council 108: 163.

The culture and description of sweet sorghum in Nebraska, USA is given.

1428 COBLE, C.G., SHMULEVICH, I., and EGG, R.P. 1983. Sweet sorghum processing for alcohol production. Paper, American Society of Agricultural Engineers no. 83-3563. 9 pp. 4 ref.

Several processing techniques were investigated. The results indicated that fermenting chopped stalks yielded more ethanol than shredded sorghum or juice, leaf removal prior to fermentation resulted in higher yields/unit feedstock, and removal of solids after fermentation yielded slightly more ethanol than solids removal before fermentation.

1429 COUTINHO, E.L.M. 1983. Effect of N, P and K on sweet sorghum fertilization, evaluated by foliar diagnosis, yields of stalks and ethanol. (Pt). Thesis, Escola Superior de Agricultura Luiz de Queiroz, Piracicaba, SP, Brazil. 99 pp. 85 ref. (Summary:En).

1430 CUNDIFF, J.S., and PARRISH, D.J. 1983. Whole-stalk sweet sorghum storage. Paper, American Society of Agricultural Engineers no. 83-3058. 19 pp. 11 ref.

Sweet sorghum for ethanol production was dried at 40, 50 and 60 deg C for 144 hrs. with an air velocity of 8.8 m/min. Moisture content was reduced from 76 to 68%, 76 to 56%, and 74 to 34%, and energy required was 12, 9, and 9 respectively, in the 3 driers used.

1431 DE MANCILHA, I.M. 1983. Improvement in alcohol yields by selected yeast fermentation of sweet sorghum. Ph.D. thesis, Michigan State University, East Lansing, Michigan, USA. 138 pp.

1432 DE ROCCHI, C.E., CUNHA, G.R., GANDOLFI, V.H., and CHIELLE, Z.G. 1983. Weed control in sugar sorghum. (Pt). Pages 159-165 In Culturas energeticas: resultados experimentais 1982/83. Porto Alegre, RS, Brazil: Instituto de Pesquisas Agronomicas.

1433 DREMLYUK, G.K., and GAMANDII, V.L. 1983. Classification by phenotype of inbred lines and forms from a collection of sweet sorghum. (Ru). Nauchno-tekhnicheskii Byulleten' Vsesoyuznogo Selektsionno-geneticheskogo Instituta 3: 42-44. 5 ref.

Twenty-two characters were studied for grouping 350 forms into 14 phenotypic main groups by cluster analysis in Ukrainian SSR.

1434 DUNCAN, R.R., SUTTON, J.D., and DOMINY, R.E. 1983. Leaf mineral element concentrations and growth of sweet sorghum subjected to acid soil stress. Journal of Plant Nutrition 6(9): 781-799.

1435 ECKHOFF, S.R., BENDER, D.A., OKOS, M.R., and PEART, R.M. 1983. Preservation of chopped sweet sorghum using sulfur dioxide. Paper, American Society of Agricultural Engineers no. 83-3558. 9 pp. 17 ref.

The effects of sulphur dioxide levels and temperature on storage of sweet sorghum was studied. 0.5% sulphur dioxide was found suitable for controlling microbial deterioration of sugar.

1436 EILAND, B.R., and CLAYTON, J.E. 1983. Sweet sorghum production, harvesting, and storage in South Florida. Pages 124-127 In Third Annual Solar and Biomass Workshop, 26-28 April 1983, Atlanta, Georgia, USA. Washington, D.C., USA: United States Department of Agriculture. 2 ref.

The sweet sorghum was planted in a pattern for harvesting using a 3-row header on a New Holland 21001/ forage harvester. Brix of the sweet sorghum was measured throughout the growing season using a hand refractometer. After the crop had passed maturity, it was harvested for tonnage yields. Results indicated that early

planting dates for sweet sorghum are best in South Florida. Several studies on weight loss and extraction of stored billets and stalks were conducted. Storage studies using sulphur dioxide as a preservative were conducted on chopped sorghum. Storage methods using billets or stalks were promising for short term storage. Chopped sweet sorghum could be preserved using sulphur dioxide for long term storage.

1437 EILAND, B.R., CLAYTON, J.E., and BRYAN, W.L. 1983. Losses of fermentable sugars in sweet sorghum during storage. Transactions of the ASAE 26(5): 1596-1600. 13 ref.

Sweet sorghum, variety Wray, was harvested at 2-wk intervals by three methods: hand-cut (whole stalks), sugarcane harvester, and forage chopper (0.5 to 5.0 cm lengths). Samples were covered and shaded from sunlight during storage for 1-wk at 25 - 30 deg C. Sample temperatures were measured, and sub-samples were analyzed for fermentable sugars at 0, 1, 2, 4, and 7 days. Hand-cut stalks and billets did not deteriorate significantly during storage, but chopped sweet sorghum lost 49% of its fermentable sugars after 1-wk. Juices were extracted from stored subsamples and fermented with the addition of 0.1% yeast. Ethanol yields (per cent of juice) were correlated with Brix of original juices.

1438 EILAND, B.R., CLAYTON, J.E., and BRYAN, W.L. 1983. Reducing fermentable sugar losses in stored sweet sorghum [for biomass fuel]. Paper, American Society of Agricultural Engineers no. 83-3065.

1439 GASCHO, G.J. 1983. The potential length of the harvest period for sweet sorghum. Pages 128-131 In Third Annual Solar and Biomass Workshop, 26-28 April 1983, Atlanta, Georgia, USA. Washington, D.C., USA: United States Department of Agriculture.

Field experiments were conducted in 1981 and 1982 to evaluate the length of the yearly harvest period of sweet sorghum grown as a feedstock for fuel alcohol at Tifton, Georgia. Allowing the sorghum to mature in a single crop resulted in higher yields than attempting to ratoon. By use of cultivars, with a range of maturities, by planting from mid April to early July and by harvesting from mid August to late December 5.7 t/ha of sugars were obtained under temperature conditions which were close to means from long-term weather records.

1440 HAMMIG, M.D., TALBERT, D.M., CROSS, D.L., LADENGBURG, K., MCCLAIN, E.F., NIX, L.E., ROBERTS, D.L., and SIMS, E.T., JR. 1983. Starch and sugar feedstock options for ethanol production. Bulletin, South Carolina Agricultural Experiment Station no. 646. 41 pp. 67 ref.

Sweet sorghum is one of the crops evaluated for ethanol production. The evaluation is focussed on crop production, ethanol production, byproduct value and storage.

1441 HAWKE, S.J., PANTER, C., HAYES, M., and NGUYEN, M.H. 1983. Selection of yeasts for fermentation of sweet sorghum juice to alcohol. Food Technology in Australia 35(3): 123-125. 6 ref.

A screening trial was undertaken to select yeasts suitable for the fermentation of sweet sorghum juice to produce ethanol. Thirty three yeasts from several collections were examined for characteristics relevant to commercial alcohol

production, including rate and extent of fermentation, temperature, sugar and alcohol tolerance, breakdown of starch, flocculation and yield of alcohol. On the basis of this screening, 7 yeasts were selected for different fermentation systems. Those chosen included Saccharomyces cerevisiae, S. diastaticus, S. carlsbergensis and S. chevalier strains.

1442 HEMMERLY, T.E. 1983. Traditional method of making sorghum molasses. Economic Botany 37(4): 406-409. 4 ref.

A traditional method of making molasses from sweet sorghum, on a Tennessee farm is described. The thin, greenish juice extracted from the stalks is boiled and attended with specially designed equipment, resulting in a sweet syrup.

1443 HILLS, F.J., JOHNSON, S.S., GENG, S., ABSHAHI, A., and PETERSON, G.R. 1983. Comparison of four crops for alcohol yield. California Agriculture 37(3-4): 17-19.

The response of corn, sweet sorghum, fodderbeet and sugarbeet to nitrogen fertilizers, yield of fermentable carbohydrates and on-farm production costs were studied at a trial conducted at California, USA. The yield of fermentable carbohydrates, and therefore potential alcohol yield, was highest for fodderbeet, followed by sugarbeet, sweet sorghum, and corn.

1444 JASBERG, B.K., and ANDERSON, R.A. 1983. Sweet sorghum storage research at Northern Regional Research Center [Illinois, USA]. Sorghum Newsletter 26: 101.

To fully utilize sweet sorghum as a biomass crop, the storage time after harvesting is recommended to be at least 6 months. In one procedure, sorghum stalks were stored, either vertically or horizontally in stacks, with minimal treatment. No sugar remained after 200 days in storage. Propionic acid and drying the stalks to 40% dry solids had no effect in maintaining the sugar content. The stalking and drying reduced total dry matter losses. In another procedure, after 200 days in storage under anaerobic conditions there was 10% sugar left in sorghum treated with 2% SO2 and 18% sugar with 2% propionic acids.

1445 JASBERG, B.K., MONTGOMERY, R.R., and ANDERSON, R.A. 1983. Preservation of sweet sorghum biomass. Biotechnology and Bioengineering S13: 113-120.

1446 KAPOCSI, I., and LAZANYI, J. 1983. Alcohol production with Hungarian sweet sorghum varieties. Sorghum Newsleter 26: 97. 3 ref.

The Hungarian sweet sorghum varieties are 20-30 days earlier than early sumac and have higher yields. The yields of sugar were 2.18, 3.57, 3.13, 3.48, 1.90 and 2.23 tonnes per hectare for the varieties ZK-102, ZK-112, Zk-103, ZK-122, ZK-404, and ZK-108, respectively. The yields of alcohol were 972, 1118, 1129, 1372, 668 and 1013 1 per hectare for ZK-102, ZK-112, ZK-103, ZK-122, ZK-404 and ZK-108, respectively.

1447 KAPOCSI, I., LAZANYI, J., and KOVACS, B. 1983. Utilization of Sorghum saccharatum in the distilling industry. Nemzetkozi Mezogasdasagi Szemle. Budapest 27(5): 47-49.

1448 KAPOCSI, I., LAZANYI, J., and KOVACS, B. 1983. Utilization of sweet sorghum for alcohol production. (De). Internationale Zeitschrift der Landwirtschaft 5:441-443. 7 ref.

1449 KAPOCSI, I., LAZANYI, J., KOVACS, B., WIELAND, A., and DEAK, P. 1983. Utilization of sorghum juice in the distilling industry [Hungary]. Szeszipar 31(2): 51-56. 10 ref.

1450 KRESOVICH, S., MORENO, E., BROWN, H.E., and MOLINA, J.J. 1983. Sweet sorghum breeding line evaluations: 1981-82. Progress Report, Texas Agricultural Experiment Station no. 4181. 16 pp. 4 ref.

During 1981-82 approximately 50 cv. of sweet sorghum were evaluated for their potential to produce sugar and to serve as raw materials for the production of energy in Texas, USA. Mer 75-10 and Mer 80-10 were good sources of sugar and ethanol because of their intermediate yields of millable stalks and their high juice quality. MN 1500 continued as a potential candidate for the generation of electricity through combustion because of its high millable stalk yield.

1451 LAMB, M., BASHFORD, L., and VON BARGEN, K. 1983. Harvesting sweet sorghum juice. Publication, Great Plains Agricultural Council 108: 147-148.

Harvesting and expression operations are combined into one operation by using a conventional forage harvester and grain roller mill.

1452 LE GRAND, F. 1983. Method for processing whole cane and sweet sorghum into fuel alcohol and electric power. (Es). Sugar y Azucar 78(10): 57-58, 60-61, 94-95. (Summary:En).

1453 LINDEN, J.C., CZAKO, L., MURPHY, V.G., and TENGERDY, R.R. 1983. Storage and preprocessing fo sweet sorghum for fermentation. Pages 139-142 In Third Annual Solar and Biomass Workshop, 26-28 April 1983, Atlanta, Georgia, USA. Washington, D.C., USA: United States Department of Agriculture. 1 ref.

The process involves initial grinding and ensiling of the raw material to extend the storage life and to increase the reactivity of the lignocellulosic fraction. Following ensiling, the lignocellulosic fraction is hydrolyzed with cellulolytic enzymes, and the resulting fermentable substrate is extracted and fermented to fuels and chemicals. Particular attention is given to changes of all carbohydrate and organic acid fractions during the course of the ensiling and the subsequent anaerobic fermentations.

1454 MASSANTINI, F., and MASONI, A. 1983. Agronomic problems related to alcohol production from Sorghum vulgare var. saccharatum L. (It). Rivista di Agronomia 17(1, suppl.): 232-237. 20 ref. (Summary:En).

Eight cv. of sweet sorghum grown in Italy were evaluated for their suitability for sugar and alcohol production. Cv. Rio and Tracy gave the highest yields. Because of its short growth cycle, limited requirements of crop management and irrigation and adaptation to marginal soils, the crop is considered to be suitable for alcohol production.

1455 MEISNER, C.A. 1983. Sorghum for molasses (gur) and sugar production. ADAB News (Bangladesh) 10(3): 44-46.

Four varieties of sweet sorghum in Bangladesh were compared with sugarcane for sucrose content, purity, and percentage recovery. Rio and Mer sweet sorghum varieties

appeared to have the greatest potential for molasses and sugar production because even after the maturity stage, the sucrose content of the stalks did not deteriorate over a period of two months.

1456 MONROE, G.E., and BRYAN, W.L. 1983. Design factors for milling sweet sorghum. Paper, American Society of Agricultural Engineers no. 83-3070.

1457 MONROE, G.E., and SUMNER, H.R. 1983. A harvesting and handling system for sweet sorghum. Paper, American Society of Agricultural Engineers no. 83-3551. 19 pp. 16 ref.

An harvesting equipment was tested for harvesting 30-cm billets at 8 t/ha. The total and net energies required were 1 and 0.3 kw h/t, respectively. A self-unloading forage wagon could meter billets at 1.5 t/h to feed a juice-expression mill.

1458 MONROE, G.E., BRYAN, W.L., HELLWIG, R.E., and SUMNER, H.R. 1983. Elements for harvesting and processing sweet sorghum [for biomass fuel production]. Pages 135-138 In Third Annual Solar and Biomass Workshop, 26-28 April 1983, Atlanta, Georgia, USA. Washington, D.C., USA: United States Department of Agriculture.

1459 MONROE, G.E., SUMNER, H.R., and HELLWIG, R.E. 1983. A leaf-removal principle for sweet sorghum. Transactions of the ASAE 26(4): 1006-1010, 1015. 8 ref.

A device using rubber fingers to remove the leaves from rows of standing stalks was developed, tested and evaluated. It was simple, compact, reliable, and safe. The average results for the better treatments using the device on Wray variety sweet sorghum were 89% leaf removal, 3% stalk loss, and 2.7 kw.h/t of leaves removed. Overall performance was better than for other detrashing devices reported for use on sweet sorghum and sugarcane.

1460 NAVARRO CARRILLO, E., and OLALLA MERCADE, L. 1983. Laboratory analysis of sugarcane and sweet sorghum: methodology. (Es). Communicaciones INIA, Tecnologia Agraria no. 7. 27 pp. 15 ref. (Summary:En).

Methods are described for sampling and analysis of sugarcane and sweet sorghum. Techniques of analysis for juice and bagasse are presented. A simple method is given for calculating analytical values of bagasse from its moisture content. Tables are appended for the correction of deg Brix with variation in temp. between 0 deg and 80 deg C, and relating the Brix with pol readings and the % sucrose.

1461 NGUYEN, M.H. 1983. Prospects of sweet sorghum for alcohol in the Pacific. Pacific Science Congress Proceedings 15(1-2): 175. (Abstract).

1462 NUESE, G.A., and HUNT, D.R. 1983. Field harvest of sweet sorghum juice. Transactions of the ASAE 26(3): 656-660. 6 ref.

A forage harvester was modified to peform in-field harvest of sweet sorghum juice. Tests were conducted to determine operating characteristics of the machine and to evaluate the potential of sweet sorghum as a source for ethanol in Central Illinois, USA.

1463 OLALLA MERCADE, L., LEON, M. DE, MORILLO, F., NAVARRO CARRILLO, E., and MIRA BELDA, A. 1983. Sweet sorghum: contribution to the study of its cultivation to produce sugar and/or alcohol in Andalucia (Spain). III. Planting

system and sowing date. (Es). Anales del Instituto Nacional de Investigaciones Agrarias, Serie Agricola 23: 9-20. (Summary:En).

Three sowing dates, 3 varieties and 2 different types of sowing, by hill, 30 x 70 cm, and by drill, with similar final populations were assayed. A negative effect was related with the earliest sowing date June 4th, in comparison with the other two, June 19th and June 22nd. No difference was observed among the varieties for sugar yield. Rio' variety reached 9.06 t/ha of total sugars and 16,35 t/ha of dry fiber, when sown on June 19th and harvested on November 15th. No difference was observed between different sowing types.

1464 OLALLA MERCADE, L., MURIEL, J.L., RUIZ, J.C., NAVARRO CARRILLO, E., and MIRA BELDA, A. 1983. Sweet sorghum: contribution to the study of its cultivation to produce sugar and/or alcohol in Andalucia (spain). IV. Studies on the irrigation regime. (Es). Anales del Instituto Nacional de Investigaciones Agrarias, Serie Agricola 23: 21-33. (Summary:En).

Two different regimes of water application, normal and restrictive during the period of maximum growth were essayed and two different dates to stop irrigation were considered in each treatment. The amount of water applied ranged between 749.5 mm and 1.064.5 m. The standard regime of irrigation was clearly better than the restrictive one, however, no significant difference could be found between the 2 dates in which irrigation was no longer applied. The best results, 10,29 t/ha of sugars (juice and bagasse) and 18,19 t/ha of dry fiber, were obtained by irrigating the Keller variety with 864.9 mm of water until September 1st.

1465 OLALLA MERCADE, L., NAVARRO CARRILLO, E., and MIRA BELDA, A. 1983. Sweet sorghum: contribution to the study of its cultivation to produce sugar and/or alcohol in Andalucia (Spain). I. General introduction. I. Sowing techniques. Comunicaciones INIA, Serie Produccion Vegetal no. 50. 29 pp. (Summary:En).

The first part, general introduction, also includes a literature review on the subject. In the second part, the results of an experiment on sowing techniques carried out in Malaga, Spain on 3 varieties are presented. "Keller" and "Wray" varieties gave excellent yields. Hill sowing was found better than drill sowing. Deep sowing with more no. of seeds/holes was found the best.

1466 PARRISH, D.J., CUNDIFF, J.S., and GAMMON, T.C. 1983. Preservation of fermentables during long-term storage of sweet sorghum stems. Pages 143-146 In Third Annual Solar and Biomass Workshop, 26-28 April 1983, Atlanta, Georgia, USA. Washington, D.C., USA: United States Department of Agriculture.

'Dale' sweet sorghum was stripped, cut, and bound into shocks of 0.5 or 1 m diameter. Bundles of each size were stored in an open shed or fully exposed to the elements. Monthly samples pulled from the bales were analyzed for moisture and fermentables. The temperatures within the bundles were monitored. The results obtained after three months storage showed no significant decline in moisture content of the stems inside the bundles. Three-quarters of fermentables remained in the stems 3 months after harvest. Location of bundles had no effect on preservation of fermentables. Stems in the larger bundles retained more of their fermentables than stems from the smaller bundles.

1467 PIGGOT, G.J. 1983. Integrating livestock and sugar-ethanol production and dairy industry in Northland - a concept. Proceedings, New Zealand Society of Animal Production 43: 107-109. 8 ref.

Arising from agronomic research into energy farming in Northland, a sugar-ethanol industry based on the crop sweet sorghum has been proposed. A theoretical analysis of dairy, sheep, and fattening beef systems indicated that a limit of 10% of the farm cropped in sweet sorghum annually would optimise the production and use of sugar-extracted crop residues based on the use of most of the residues as silage. If such material could be converted directly to increase stocking rate, a substantial rise in net farm income was predicted from growing sweet sorghum for sugar. A limited survey of Northland farmers revealed the prospects for sugar-and-forage industry concept at the farm level.

1468 POSLER, G.L., and HILL, N.S. 1983. Harvesting and storage of sweet sorghum biomass. Pages 132-134 In Third Annual Solar and Biomass Workshop, 26-28 April 1983, Atlanta, Georgia, USA. Washington, D.C., USA: United States Department of Agriculture.

Field studies were conducted during 1982 at Manhattan, USA to evaluate sugar contents of sweet sorghum following selected harvesting procedures. Cultivars left standing in the field beyond optimum harvest maturity declined steadily in sugar content and total biomass yield. Per cent leaf and top declined and per cent stalk increased with delayed harvest. Per cent glucose and fructose increased slightly with delayed harvest, but percent sucrose declined drastically. Sugar content was slightly greater for stacked plants than for standing plants. Total sugar contents and yields were slightly greater for topped than for intact plants. Total sugar yields ranged from 2.0 to 5.2 Mt/ha. Silages were made in 1981 from Rio and Dale sweet sorghum treated with organic acids. Percent sugar recovery was greater as the amount of acid application increased.

1469 RICAUD, R., and ARCENEAUX, A. 1983. Sweet sorghum for biomass and sugar production in Louisiana. Report of Projects, Louisiana Agricultural Experiment Station, Department of Agronomy. pp. 330-335.

An experiment was conducted to determine the effects of varieties and dates of planting on the biomass and sugar yields of sweet sorghum for fuel alcohol production. The biomass yield was significantly higher from the April than the May planting in the varieties tested except Mer. 76-6. The April planting produced more sucrose, total sugars and alcohol per acre than the May planting.

1470 ROBBS, P.G., SANTANA, D.M. DA N., GULARTE, J.L. DOS S., and TEIXEIRA C.G. 1983. Ethanol production from grain flour and saccharine sorghum. (Pt). Documentos, Centro de Tecnologia Agricola, e Alimentar, EMBRAPA (Brazil) no. 3. 32 pp.

1471 ROSOLEM, C.A., MACHADO, J.R., COLETA, O.D., and MARCONDES, D.A.S. 1983. Effects of liming and potassium fertilization on sweet sorghum grown in a dark-red latosol. (Pt). Pesquisa Agropecuaria Brasileira 18(4): 351-356. 12 ref. (Summary:En).

The effects of 0, 2, 4, 6 and 8 t/ha of lime with or without 100 kg/ha of K20 was studied. The

experiment was conducted during two years, with the K being reapplied, and without liming. In the first year there was an interaction of lime and K. The stalk yields were increased by liming up to 2 t/ha in the absence of K fertilizer but when K was applied the yields of sweet sorghum stalks were increased by doses up to 4 t/ha of lime. There was an increase in grain production due to liming up to 2 t/ha, but there was not any effect of K fertilization. In the second year there was a linear response of stalk yields to liming and the application of 100 kg/ha of K20 caused an increase in stalk production. There was no effect of treatments on juice quality.

1472 SAKAGUCHI, S., and SASAKI, S. 1983. Proliferation technologies of biomass resources. Farming Japan 17(5): 20-29.

Sweet sorghum is one of the crops considered as biomass crops in Japan, as the plant is also used in alcohol production. The plant has good resistance to insects, diseases, drought and wet conditions. Its growing period is short and productivity is high. Its bagasse could be used as feed or fuel. Research is conducted in Japan to select suitable varieties and sites and to establish high yielding technologies.

1473 SILVA, H. 1983. Effects of sweet sorghum (Sorghum bicolor (L.) Moench) fertilization on juice quality for yeast multiplication and alcoholic fermentation. (Pt). Thesis, Escola Superior de Agricultura Luiz de Queiroz, Piracicaba, SP, Brazil. 295 pp. 150 ref. (Summary:En).

1474 SOARES, G.J.S., CHIELLE, Z.G., and CHIELLE, M.C.P. 1983. National trial of sugar sorghum (Brazil). (Pt). Pages 153-158 In Culturas energeticas: resultados experimentais 1982/83. Porto Alegre, RS, Brazil: Instituto de Pesquisas Agronomicas.

1475 STEPHENSON, K.O. 1983. Sweet sorghum biomass production and processing. Paper, American Society of Agricultural Engineers no. 83-3064.

1476 STOLIARENKO, S.B. 1983. Valuable for breeding specimens of Sorghum saccharatum Convar. technicum. (Ru). Biulleten, Vsesoiuznyi Institut Rastenievodstva 134: 46-47.

1477 WALKER, C.E., OGDEN, R.L., and REIN, B.K. 1983. Producing fuel alcohol from sweet sorghum juice. Publication, Great Plains Agricultural Council 108: 149-150.

The juice from the stalks of sweet sorghum (sorgo) contains a high sugar content which is ideal for ethyl alcohol production. The objectives of this part of the Energy Integrated Farm Project are (1) to ferment the sugar into alcohol and (2) to separate the alcohol by distillation from the rest of the juice (mostly water). The alcohol will be produced at approximately 180 proof for direct use in spark ignition engines.

1478 YASUI, T., and OGURA, A. 1983. Low molecular weight carbohydrates in sweet sorghum (Sorghum bicolor (L.) Moench). Report of the National Food Research Institute (Japan) 43: 21-30. 13 ref.

The low molecular weight carbohydrates contents in stalks, leaves with leaf sheaths, and panicles were determined in 5 cv. of sweet sorghum by gas liquid chromatography. Soluble solids contents in all internodes and leaf midribs of randomly selected plants were also determined with a

refractometer. The cv. differed in their carbohydrates compositions, which varied with the growth periods of sorghums after heading. The fructose content in stalks was found to be positively correlated with the glucose content in stalks. The sucrose content in stalks was negatively correlated with the fructose and glucose content in stalks. Although the soluble solids content in leaf midribs was highly correlated with the low molecular weight carbohydrates content in stalks, the contribution proportion was too small to estimate the saccharides content by the measurement of refractometric Brix degree of the pressed juices from leaf midribs.

1479 ZVARA, V.J., and HERGER, P. 1983. Screening of sweet sorghum hybrid varieties (Sorghum saccharatum) in a pot experiment. (De). Bodenkultur 34(3): 213-219. 15 ref. (Summary:En).

In a pot experiment 6 hybrid varieties of sweet sorghum were tested on black and on brown soil. The variety FS 531 exceeded the others in the amount of sap, sugar content of the sap, and sugar yield. The application of sewage sludge improved the sap yield/pot of all variants. The sugar yield on the black soil was higher than on the brown soil. At plant densities of 150,000/ha, the yield of fresh matter was between 17 and 98 t/ha, the sugar yield between 0.8 and 5.7 t/ha.

WEED SORGHUM

1480 AGUILAR Z.,O. 1983. Some aspects of the reproductive ability of false johnson (grass), Sorghum verticilliforum (Steud) Stapf (weed). (Es). Thesis, Universidad Central de Venezuela, Maracay, Venezuela. 72 pp. 48 ref.

1481 ALVAREZ, J.C., BUZIO, C.A., and LOPEZ, G.L. 1983. Control of johnsongrass (Sorghum halepense) in soybeans with rope outfits. (Es). Malezas 11(4): 45-48.

1482 AMIN, A., and ASHFAQ, R.M. 1983. Production studies of important rangeland species of Azad Kashmir [Pakistan]. Pakistan Journal of Forestry 33(3): 99-104. 3 ref.

Productivity and phenological studies conducted on forage species includes Sorghum halepense.

1483 ATKINS, R.L., MAXCY, F.B., GONZALEZ, F.E., and LINK, M.L. 1983. A new product for johnsongrass (Sorghum halepense) control in roadside turf. Proceedings of the Southern Weed Science Society 36: 300-309. 4 ref.

1484 BANKS, P.A., and TRIPP, T.N. 1983. Control of johnsongrass (Sorghum halepense) in soybeans (Glycine max) with foliar-applied herbicides. Weed Science 31(5): 628-633. 10 ref.

Field and greenhouse experiments were conducted to evaluate 3 foliarly-applied herbicides, BAS-9052, PP-009 and CGA-82725. Mixing BAS-9052 with other herbicides significantly reduced johnsongrass control. Greenhouse studies to determine the effect of soil water on herbicide response indicated that drier soils decreased johnsongrass regrowth with PP-009 and increased regrowth with BAS-9052.

1485 BEITLER, J.S., EIKER, W.M., FINNERTY, D.W., FLANIGAN, H.A., FOOR, S.R., GORRELL, R.M., and RENKOSKI, M.A. 1983. Postemergence grass [Sorghum halepense] control in soybeans with

DPX-Y6202. Proceedings of the North Central Weed Control Conference. p. 7. (Abstract).

1486 BENGOA GIUFFRIDA, R.E. 1983. Allelopathic effect of five perennial weeds [Sorghum halepense] on the growth of young peach plants. (Es). M.Sc. thesis, Universidad de Chile, Santiago, Chile. 122 pp. 140 ref. (Summary:En).

1487 BERTUCCI, B.M. 1983. History, biology and control of johnsongrass. (It). Informatore Fitopatologico 33(1): 26-35. 8 ref.

1488 CABALLERO, L.M., and LAPHITZONDO, M.G. 1983. Control of johnsongrass seeds in maize crops with atrazine 25% and methyl chloride 25% (Primagram 50 FW). (Es). Malezas 11(3): 45-49.

1489 CARLSON, K.L., and BURNSIDE, O.C. 1983. Relative toxicity of SC-0224, SC-0545, HOE-00661 and glyphosate to annual grasses [sorghum]. Proceedings of the North Central Weed Control Conference. pp. 22-23. (Abstract).

1490 CARTER, D.R., and PETERSON, K.M. 1983. Effects of a carbon di oxide enriched atmosphere on the growth and competitive interaction of a 3 carbon pathway and a 4 carbon pathway grass. Oecologia 58(2): 188-193.

1491 CASTANEDA, R.R.F., GUERRA, A.G., and ARNOLD, G.R.W. 1983. New species of the genus Saccardaea. (Es). Revista del Jardin Botanico Nacional 4(3): 27-34.

1492 CASTILLO BRICENO, J.L. 1983. Some aspects of sexual reproductivity of johnson grass (Sorghum halepense (L) Pers) weeds. (Es). Thesis, Universidad Central de Venezuela, Maracay, Venezuela. 77 pp. 66 ref.

1493 CATIZONE, P., and BALDONI, G. 1983. Biology of an important weed: Sorghum halepense. (It). Informatore Fitopatologico 33(5): 39-46. 46 ref. (Summary:En).

The aim of this work was to evaluate the germination of johnsongrass rhizomes with reference to time, rhizome cutting, temperature and rhizome size.

1494 CHANDLER, J.M., and MERKLE, M.G. 1983. Johnsongrass control in Central Texas. Proceedings of the Southern Weed Science Society 36: 40-41. (Abstract).

1495 CORREGE, E. 1983. Furore: a new postemergence selective herbicide for the control of johnsongrass in soybeans. (Es). Malezas 11(4): 165,167-170.

1496 CORREGE, E., CATTENA, H.L., and STACUL, H. 1983. Influence determination of antievaporated oil aggregates on the performance of phenoxipropetil in the control of johnsongrass (Sorghum halepense). (Es). Page 100 In Resumenes, 5. Jornadas Fitosanitarias Argentinas, 7-9 September 1983, Rosario, Santa Fe, Argentina. Rosario, Santa Fe, Argentina: Universidad Nacional de Rosario.

1497 DALE, J.E. 1983. Multi-chemical granules for weed [Sorghum halepense] control in soybeans. Proceedings of the North Central Weed Control Conference. pp 127-128. (Abstract).

1498 DANIN, A. 1983. Sorghum halepense (L.) Pers. and Sorghum virgatum (Hack.) Stapf in Israel. Israel Journal of Botany 32(3): 172-173.

S. virgatum was recorded for the

first time in Israel Sinai. It had long been present in the country but had been overlooked owing to its similarity to S. halepense.

1499 DAVRANOV, K.S., and VAKHABOV, A. KH. 1983. Pathogenecity of maize dwarf mosaic virus and plant susceptibility to the virus after artificial infection [Sorghum halepense]. (Ru). Docklady Vsesoyuznoi Ordena Lenina i Ordena Trudovogo Krasnogo Znameni Akademii Sel'skokh-ozyaistvennykh Nauk Imeni V I Lenina 1: 14-16.

1500 DEFELICE, M.S., WITT, W.W., MARTIN, J.R., and SLACK, C.S. 1983. The effects of johnsongrass control programs on no-tillage soybean yields. Proceedings of the North Central Weed Control Conference. p. 13. (Abstract).

1501 DERTING, C.W., SANDBERG, C.L., WHATLEY, T.L., and WU, C.H. 1983. Cost effectiveness of postemergence glyphosate and sethoxydim to johnsongrass in soybeans and cotton. Proceedings of the Southern Weed Science Society 36: 21-25. 6 ref.

Field experiments were established to examine the cost, control, yield and economic return to treatment of emerged rhizome johnsongrass in emerged cotton and soybeans. Infestation levels were sparse to moderate (0.16 to 0.4 plants/m2). Treatments were with solutions of glyphosate (N-(phosphomomethyl)glycine) in a ropewick applicator and sethoxydim, 2-(1-(ethoxyimino) butyl)-5-(2-(ethylthio)proply)-3-hydroxy- 2 -cyclohexen-1-one, sprayed sequentially to preplant application of dinotroaniline herbicide. Yields were not significantly responsive to treatment, control was highest with sethoxydim, and only the wick application of glyphosate was cost effective.

1502 FALCON, L.M.F. DE, VELAZQUEZ, P., and CONDE, A.A. 1983. Control of johnsongrass in maize crops with S-ethyl dipropylthiocarbamate and dichloroacetamide. (Es). Malezas 11(3): 51-61. 6 ref.

1503 FERNANDEZ, M.H., GHERSA, C.M., and SATORRE, E.H. 1983. Behavior of seeds of Sorghum halepense (L) Pers. in relation to rhizome population. (Es). Revista de la Facultad de Agronomia, Universidad de Buenos Aires 4(3): 227-231. 22 ref. (Summary:En).

Seeds of Sorghum halepense were studied in wheat fields following 1 yr fallow and 6 yr mixed pasture. DM was not related to seed germination and mortality and high rhizome biomass inhibited seedling growth.

1504 FRYER, J.D. 1983. Recent research on weed management - new light on an old practice. Pages 181-198 In Recent advances in weed research (Fletcher, W.W., ed.). Slough, Farnham Royal, UK: CAB. 41 ref.

Includes management of Sorghum halepense in soybeans.

1505 GHERSA, C.M., LEON, R.J.C., and SATORRE, E.H. 1983. The population dynamics of johnsongrass rhizomes in a soybean crop. (Es). Malezas 11(1): 130-141. 13 ref. (Summary:En).

The dynamics of johnsongrass rhizomes was studied in a soybean field in Buenos Aires, Argentina. Rhizome biomass in the 0-15 and below -15 cm layers of the soil profile was followed and rhizome distribution was observed. Tillage and trifluralin did not kill all

the rhizomes. Rhizomes located below the ploughing depth survived the control measures and were responsible for most of the regeneration of the johnsongrass population.

1506 GIRI, M.K., and FREYTAG, P.H. 1983. Biology of Delphacodes lutulenta Homoptera Delphacidae. Annals of the Entomological Society of America 76(2): 274-277.

1507 GREEN, J.D., WITT, W.W., and MARTIN, J.R. 1983. Johnsongrass control in corn with trifluralin. Proceedings of the Southern Weed Science Society 36: 41. (Abstract).

1508 HANDLY, J.V., GERWICK, B.C., and VATNE, R.D. 1983. Preemergence potential for haloxyfop-methyl in soybean production. Proceedings of the North Central Weed Control Conference. p. 10. (Abstract).

1509 HARGRAVE, M.R., and WATKINS, S.D. 1983. Control of perennial grasses [Sorghum halepense] in cotton with fluazifop. Proceedings of the Western Society of Weed Science 36: 130-136. 5 ref.

1510 HOOK, B.J., GLENN, S., and KITCHEN, L.M. 1983. Carbohydrate content of glyphosate treated johnsongrass. Proceedings of the Northeastern Weed Science Society 37: 109. (Abstract).

Date of application influenced carbohydrate levels in rhizome and seed tissue. Glyphosate had less effect on carbohydrate content of johnsongrass when applications were delayed to later growth stages. Total soluble sugars were decreased in rhizome tissue 70, 44, and 40% for early-post, mid-post, and late-post treatments, respectively. Starch was reduced 84, 73, and 44%, respectively for the same treatments. The level of carbohydrates remaining in storage tissue following glyphosate application may directly affect the potential for rhizome regrowth and seed germination of second generation johnsongrass in subsequent growing seasons.

1511 JOHNSON, J.R., HURST, H.R., and ARNOLD, B.L. 1983. Controlling annual grasses and johnsongrass in cotton grown with minimum seedbed preparation. MAFES Research Highlights 46(4): 3-4.

1512 KEMPEN, H.M. 1983. Selective grass herbicides [Sorghum halepense] on cotton in California. Proceedings of the Western Society of Weed Science 36: 136-142. 4 ref.

1513 KHALIFA, M.A., WITTMUSS, H.D., and BURNSIDE, O.D. 1983. Subsurface placement methods for metribuzin and trifluralin. Weed Science 31(6): 840-844. 18 ref.

Applications of trifluralin at 1.1 kg ai/ha in vertical bands followed by 0.6 kg ai/ha mixed in the surface 2.5 cm controlled forage sorghum as well as or better than surface application followed by incorporation. The combined subsurface and surface trifluralin placement systems were effective for application depths up to 7.5 cm and band spacings up to 2 cm wide. The development of effective subsurface herbicide injection systems would make the use of herbicides requiring incorporation feasible in reduced tillage crop production systems.

1514 KIHARA, R. 1983. Hache uno super, a new grass killer for the selective control of johnsongrass, Sorghum halepense. (Es). Malezas 11(4): 176,178-186. 8 ref.

1515 KINNEY, D. 1983. Hoe 33171 - a new postemergence grass herbicide. Proceedings of the Southern Weed Science Society 36: 440. (Abstract).

Rhizomatous Sorghum halepense was controlled effectively by 0.34 kg/ha of Hoe 33171 (fenoxaprop).

1516 KIRKBY, J.T., and GLENN, S. 1983. Wounded johnsongrass response to glyphosate. Proceedings of the Annual Meeting of the Northeastern Weed Science Society 37: 17. (Abstract).

Effects of glyphosate on wounded johnsongrass were evaluated at Maryland, USA by field and greenhouse studies. Johnsongrass control was greatest for glyphosate treatments made to uncut johnsongrass. The greenhouse study revealed that the glyphosate applied directly on a wound was more efficacious than applied to non-wounded tissue.

1517 KLEIFELD, Y., BLUMENFELD, T., and BERGUTTI, A. 1983. Control of johnsongrass in cotton fields. Page 938 In Proceedings of the Tenth International Congress of Plant Protection, 20-25 November 1983, Brighton, UK. v. 3. Croydon, UK: British Crop Protection Council. 6 ref.

1518 KNOKE, J.K., LOUIE, R., MADDEN, L.V., and GORDON, D.T. 1983. Spread of maize dwarf mosaic virus from johnsongrass to corn. Plant Disease 67(4): 367-370. 16 ref.

1519 KNOWLES, T.C., and BENSON, A.A. 1983. Mode of action of a herbicide. Johnsongrass and methanearsonic acid. Plant Physiology 71(2): 235-240. 30 ref.

Johnsongrass is sensitive to methanearsonate, foliar application resulting in a topkill. Investigation of the pattern of photosynthesis by radioautography revealed an accumulation of malate in methanearsonate-treated leaves. Accumulation of malate was attributed to an inhibition of NADP+- malic enzyme which was found to be sensitive to sulfhydryl group reagents including arsenosomethane, CH3AsO. Methanearsonate was found to act as an oxidant in the Hill reaction using spinach chloroplasts, the photoproduct being a sulfhydryl group reagent. These results suggest that methanearsonate inhibits CO2 release from malate in bundle sheath cells, depriving the plant of its source of carbon for sucrose production.

1520 KOROSMEZEI, CS. 1983. The activity of axillary buds in glyphosate-treated Sorghum halepense (L.) Pers. (Hu). Novenyvedelem 19(4): 145-148. (Summaries:De, En, Ru).

Sorghum halepense was treated in hybrid maize by 2 kg glyphosate active material per hectare and the effectivity was evaluated by using the EWRC scoring system. The size of sorghum foliage at the time of treatment considerably influenced the herbicidal effect.

1521 KUKAS, R., and CRAMER, G. 1983. Rhizome johnsongrass control in cotton with sethoxydim. Proceedings of the Western Society of Weed Science 36: 127-129. (Abstract).

The most effective control of johnsongrass was achieved with 0.3 lb sethoxydim either at 2 wk after initial spraying or at regrowth of johnsongrass 4-8 in. high.

1522 LAMOREAUX, R.J., BLYTHE, T.O., and UMMEL, E.L. 1983. Weed control in Texas High

Plains cotton with zorial. Proceedings of the Southern Weed Science Society 36: 438. (Abstract).

1523 LANGEMEIER, M.L., WITT, W.W., MARTIN, J.R., and SLACK, C.S. 1983. Controlling johnsonsgrass in reduced tillage systems for soybeans. Proceedings of the North Central Weed Control Conference. p. 1. (Abstract).

1524 LEGUIZAMON, E.S. 1983. Population dynamics of johnsongrass (Sorghum halepense L. Pers.) in soyabeans. Approach to the study.--First assessment of the impact of different levels of control on the stock of propagules. (Es). Malezas 11(5): 211, 213-223. 18 ref. (Summary:En).

The seeds and rhizome buds of S. halepense were assessed following a soyabean crop. In the fallow period, 10% of seeds and 48% of buds survived. Losses were attributed to decay, death and predation. The most effective reduction in rhizome buds followed treatment with 1.78 kg trifluralin/ha.

1525 LEGUIZAMON, E.S., ALVAREZ, J., and LOMBARDO, A.P. 1983. Evaluation of herbicides applied to preharvested wheat for the control of johnsongrass (Sorghum halepense) and purple nutsedge (Cyperus rotundus). (Es). Informacion Preliminar, Estacion Experimental Agropecuaria Oliveros (Argentina) no. 12. 5 pp.

1526 LEGUIZAMON, E.S., ALVAREZ, J., LOMBARDO, A.P., BERGMANN, R., and GRAVIOTO, R. 1983. Evaluation of glyphosate, preharvest application for control of johnsongrass and nutgrass. (Es). Malezas 11(3): 69-73. 4 ref.

1527 MASSION, C.L., and LINDOW, S.E. 1983. Effect of Sphacelotheca holci infection on morphology and competitiveness of Sorghum halepense. Phytopathology 73(5): 822. (Abstract).

The height above ground biomass, and lateral rhizome expansion of field-grown smutted S. halepense was significantly lower than healthy plants. The aboveground biomass of smutted S. halepense grown in the greenhouse with corn was significantly lower than healthy plants and both were significantly lower than comparable plants grown without corn competition. Interaction of stress due to smut infection and plant competition on rhizome extension of S. halepense was also measured.

1528 MCMAHON, G., and FRESHWATER, I. 1983. Noxious weeds [Sorghum halepense] in sugarcane. BSES Bulletin 4: 17-18.

1529 MENINATO, R. 1983. Johnsongrass control in soybeans with haloxyfop-methyl in Ohio and Kentucky. Proceedings of the North Central Weed Control Conference. p. 15. (Abstract).

1530 MIKULAS, J. 1983. Effect of planting depth on the regeneration of rhizomes in Sorghum halepense (L.) Pers. Acta Agronomica Academiae Scientiarum Hungaricae 32(1-2): 17-21. 7 ref.

The regeneration of 7-node decapitated rhizome segments of Sorghum halepense planted 2.5, 5, 10 and 15 cm deep was studied. With an increase in the depth of planting, the time required for regeneration became longer and the number of shoots fewer. Apical dominance was irrespective of the depth of planting. The optimum depth of planting for the regeneration of the rhizomes was 2.5-5 cm. If the rhizomes cut up are ploughed deeper than 15 cm into the soil, a high percentage of the

shoots developing from the buds will only reach the soil surface slowly, which makes them easier to control.

1531 MILLER, J.H., and CARTER, C.H. 1983. Fluridone for annual weed [Sorghum halepense] control in Western irrigated cotton (Gossypium hirsutum). Weed Science 31(3): 290-293. 16 ref.

1532 NICOLLIER, G.F., POPE, D.F., and THOMPSON, A.C. 1983. Biological activity of dhurrin and other compounds from johnson grass (Sorghum halepense). Journal of Agricultural and Food Chemistry 31(4): 744-748. 13 ref.

Phytotoxins and taxiphyllin isolated from methanolic extracts of johnsongrass rhizomes were active against tomato and radish seedling root growth and also inhibited growth of several of nine bacteria tested. A 13C NMR method is presented for distinguishing the epimers dhurrin and taxiphyllin which were found in johnsongrass rhizomes.

1533 NUNEZ, J.R. 1983. Diurnal fluctuation of leaf solutes and their role in the osmotic adjustment of a johnsongrass (Sorghum halepense (L.) Pers.) cultivar in response to low-water stress. Ph.D. thesis, Texas A & M University, College Station, Texas, USA. 176 pp.

A research was conducted to study the role of carbohydrates, dhurrin, organic acids, amino acids, and potassium in the osmotic adjustment of johnsongrass as a possible mechanism of drought resistance and to characterize and quantitate the solutes involved and their diurnal fluctuations in stressed leaves. The role of starch in this process was also studied. A mild water stress induced an accumulation of solutes in mature, fully expanded leaves of johnsongrass. The drop in osmotic potential in stressed plants was about -0.30 MPa lower than nonstressed plants and the overall water potential of stressed plants was about -0.40 MPa lower than nonstressed ones. There was a drop in turgor potential of about -0.10 MPa indicating a partial turgor maintenance in stressed plants. The persistence of johnsongrass in arid climates could be attributed to its capability for adjusting osmotically and maintaining turgor, resulting in the maintenance of high leaf water potential.

1534 PARSELLS, A.J., FAWZI, M.M., CLAUS, J.S., and SUMMERS, J.C. 1983. DPX-Y6202 - a new postemergence grass herbicide for soybeans, cotton and other broadleaf crops. Proceedings of the North Central Weed Control Conference. pp. 14-15. (Abstract).

1535 PRINCE, R.W., and HARGER, T.R. 1983. A new approach to economic thresholds [Sorghum halepense in soybeans]. Proceedings of the Southern Weed Science Society 36: 347-348. (Abstract).

1536 RAPPARINI, G. 1983. Seasonal weed [Sorghum halepense] control: virus and fruit trees. (It). Informatore Agrario 39(50): 28679-28685.

Mixtures of simazine, paraquat, 2,4-D, MCPA or glyphosate are recommended for the control of Sorghum halepense in vines.

1537 RETZINGER, E.J., JR., ROGERS, R.L., and MOWERS, R.P. 1983. Performance of BAS 9052 applied to johnsongrass (Sorghum halepense) and soybeans (Glycine max). Weed Science 31(6): 796-800.

The performance of BAS 9052 was evaluated when applied postemergence to rhizome and

seedling johnsongrass in soybeans at different growth stages. The degree of weed control was more strongly associated with rainfall conditions than with the size of the johnsongrass. Soybean yields wereincreased by 260 kg/ha when BAS 9052 was applied at the V3 to V4 compared to the V5 to V7 growth stage.

1538 REYNOLDS, D.B., OLIVER, L.R., and CROWLEY, R.H. 1983. Johnsongrass (Sorghum halepense) interference with cotton. Proceedings of the Southern Weed Science Society 36: 347. (Abstract).

Sorghum halepense was more competitive under adequate moisture and normal temperature conditions than under moisture stress and high temperature.

1539 RODRIGUEZ, N.E. 1983. Incidence and control of johnsongrass (Sorghum halepense) [by herbicides] in peanuts. (Es). Page 86 In Resumenes, 5. Jornadas Fitosanitarias Argentinas, 7-9 September 1983, Rosario, Santa Fe, Argentina. Rosario, Santa Fe, Argentina: Universidad Nacional de Rosario.

1540 ROSSER, S.W., WITT,W.W., and OLSON, G.L. 1983. The effect of moisture stress on johnsongrass control with fluazifop. Proceedings of the Southern Weed Science Society 36: 353. (Abstract).

When 0.04 kg fluazifop/ha + 0.1% X-77 was applied to the plants, visual injury, FW and DW were reduced after 3 weeks under water stress for 60 h before treatment, but visual injury was not reduced with 0.09-0.16 kg fluazifop. Absorption of 14C-fluazifop at 24 or 27 h after treatment was not reduced by moisture stress. Translocation of 14C was significantly reduced by water stress.

1541 RUFFIN, J., BROWN, C.A., and BANERJEE, U.C. 1983. A physiochemical characterization of allergenic pollen-held proteins. Environmental and Experimental Botany 23(4): 311-319. 23 ref.

Polyacrylamide gel electrophoresis and thin-layer chromatography were used in the characterization of protein and free amino acid extracts from wood and herbaceous plants including johnson grass. There is a positive correlation between atmospheric pollen grains as well as the pollen wall proteins and free amino acids for allergic potentiality. Polyacrylamide gel electrophoresis of acidic proteins demonstrated the heterogeneous nature of the pollen and illustrated systematic differences in protein extracts. Phylogenetic linkages were reflected in the amino acid content of johnson and rye grasses.

1542 SKENDER, A., STEVIC, I., and PITRA, L. 1983. Effects of herbicides and mowing on the aboveground and subterranean biomass of johnsongrass in ditches. (Sh). Fragmenta Herbologica Jugoslavica 12(1): 111-119. 15 ref. (Summary:En).

Top growth biomass reductions of 96.63-99.49% were observed by the use of glyphosate, dalapon and asulam to control johnsongrass in drainage ditches. But rhizome control was impaired when treated after mowing. The presence of broadleaved weeds reduced johnsongrass biomass in the absence of herbicides or mowing.

1543 SOVERCHIA, G. 1983. A new machine against infestations by Sorghum halepense. (It). Terra e Vita 24(44): 92-95.

1544 STRACHAN, F., and KINNEY, D. 1983. Johnsongrass control with HOE-00581. Proceedings of the Southern Weed Science Society 36: 61-62. (Abstract).

1545 STUART, B.L., ABERNATHY, J.R., and KRIEG, D.R. 1983. The effects of plant water status on johnsongrass physiology. Proceedings of the Southern Weed Science Society 26: 351. (Abstract).

Under low moisture availability,the conductance level of Sorghum halepense was more than that of non-irrigated plants. Irrigated plants were more sensitive to increasing leaf temperature and leaf conductance converged. There was a high sensitivity to decreasing water stress. The amount of radioactivity in the roots acropetal movement increased with irrigation.

1546 SWISHER, B.A., and CORBIN, F.T. 1983. Fate of MBR-18337 in soybean (Glycine max) and johnsongrass (Sorghum halepense) plants and cell cultures. Weed Science 31(2): 242-246. 8 ref.

Uptake, translocation, and metabolism of 14C-MBR-18337 in soybean and johnsongrass plants and cell cultures were studied. Sixty-five per cent of the 14C recovered from soybean was on or in the treated leaf, compared to 81% of the 14C recovered from johnsongrass (43% of that applied). Translocation of the 14C from the treated leaf was greater in soybean than in johnsongrass, but was primarily to the apical leaves of both spp. MBR-18337, its sulfoxide, sulfone, and an unidentified polar component(s) were isolated from intact plants and cell cultures of both spp. Soybean plants and cells contained greater proportions of the polar component(s) than johnsongrass plants and cells.

1547 TAUTVYDAS, K.J. 1983. Synergistic growth retardation of grasses [Sorghum halepense] with mefluidide/PGR combinations. Pages 51-56 In Proceedings, Tenth Annual Meeting, Plant Growth Regulator Society of America. East Lansing, Michigan, USA: Plant Growth Regulator Society of America. 12 ref.

1548 VELJKOVIC, B., MIJATOVIC, K., and STAMENOV, M. 1983. Possibility of controlling resistant weed species [Sorghum halepense] in orchards [Yugoslavia]. (Sh). Zastita Bilja 34(1): 141-149. 9 ref. (Summary:En).

Sorghum halepense could be controlled by glyphosate, fluazifop-butyl and by a combination of oxyfluorphen and dalapon.

1549 WALLENS, P.G. 1983. Control of grain sorghum regrowth with Roundup herbicide. Pages 119-122 In No-tillage crop production in northern New South Wales: proceedings of the Project Team Meeting, 4 May 1983, Tamworth, New South Wales, Australia (Martin, R.J., and Felton, W.L., eds.). Tamworth, New South Wales, Australia: Department of Agriculture.

Twenty one trials involving 17 grain sorghum varieties were done during 1982 and 1983 to determine suitable sorghum control techniques using Roundup. The results of the trials are tabulated. Grown-out levels in a rate range of 1.5 L/ha to 2.0 L/ha for both pre and post harvest application on several varieties were found acceptable. Preharvest treatment at about 25% grain moisture is recommended.

1550 WALLENS, P.G. 1983. Roundup performance on common fallow weeds in northern Australia. Pages 113-118 In No-tillage crop production in northern New South Wales: proceedings of the Project Team Meeting, 4 May 1983, Tamworth, New South Wales, Australia (Martin, R.J., and Felton, W.L., eds.). Tamworth, New South Wales, Australia: Department of Agriculture.

Volunteer sorghum (S. bicolor) is one of the weeds listed in the tabulated guide given for the use of Roundup.

1551 WARWICK, S.I., and BLACK, L.D. 1983. Gen ecological studies of a new problem weed in Canada. American Journal of Botany 70(5, part 2): 135. (Abstract).

1552 WARWICK, S.I., and BLACK, L.D. 1983. The biology of Canadian weeds. 61. Sorghum halepense (L.) Pers. Canadian Journal of Plant Science 63(4): 997-1014. 96 ref. (Summary:Fr).

A review of biological information is provided for Sorghum halepense (L.) Pers., johnsongrass. A native of southern Eurasia to India, S. halepense has recently become established in 10 counties in southern Ontario. S. halepense infestations result in severe crop losses either from competition or allelopathic effects and/or by serving as an alternative host for several crop pests. Johnsongrass has several features which contribute to its success as a weed, including the production of extensively creeping rhizomes and large number of seeds, rhizomes, which regenerate easily if cut into small pieces in cultivation procedures, self-compatibility, seed longevity, seed dormancy and vigorous growth under a wide range of environmental conditions. One population of S. halepense from Brant County, Ontario is known to produce rhizomes which successfully overwinter in Canada. A combination of repeated tillage, herbicides and crop rotation will effectively control johnsongrass.

1553 WIEPKE, T., PEREGOY, R., HOOK, B.J., and GLENN, S. 1983. Postemergence johnsongrass control in no-tillage soybeans. Proceedings of the Annual Meeting of the Northeastern Weed Science Society 37: 44.

Several herbicides were evaluated for postemergence Sorghum halepense L. control in no-tillage soybeans at Maryland, USA. The herbicides evaluated were CGA-82725, HOE-00581, SC-1058, sethoxydim, fluazifop, and mefluidide. Treatments using glyphosate and SC-0224 applied with a wickbar were also evaluated. All plots were treated with paraquat prior to planting. Experiments were organized as randomized complete block designs with three replications. Postemegence herbicides provided good johnsongrass control and increased soybean yields. Johnsongrass control with wickbar treatments was not as effective.

1554 WILKERSON, J.J., and DOTY, C.H. 1983. The use of adjuvants to enhance activity of fluazifop-butyl on johnsongrass. Page 577 In Proceedings of the Tenth International Congress of Plant Protection, 20-25 November 1983, Brighton, UK. v. 2. Croydon, UK: British Crop Protection Council. 2 ref.

The studies indicate that either a nonionic surfactant at 0.25% or an oil concentrate at about 1% may be used to enhance the efficiency of fluazifop-butyl on Sorghum halepense. Spray volume and moisture stress could affect the

activity of the herbicide and adjuvants.

1555 WILLIAMS, M.C., and JAMES, L.F. 1983. Effects of herbicides on the concentration of poisonous compounds in plants - a review. American Journal of Veterinary Research 44(12): 2420-2422.

1556 WILLS, G.D., and MCWHORTER, C.G. 1983. Effect of environment and adjuvants on the translocation and toxicity of fluazifop in Cynodon dactylon and Sorghum halepense. Aspects of Applied Biology 4: 283-290. 17 ref.

1557 WITT, W.W., and MARTIN, J.R. 1983. Soybean row spacing influence on johnsongrass control. Proceedings of the Southern Weed Science Society 36. 62-63. (Abstract).

1558 YONCE, C.E. 1983. Geographical and seasonal occurrence, abundance, and distribution of phony peach disease vectors and vector response to age and condition of peach orchards and a disease host survey of johnsongrass for rickettsia-like bacteria in the southeastern United States. Journal of the Georgia Entomological Society 18(3): 410-418. 8 ref.

Johnsongrass as a possible reservoir for rickettsia like bacteria (RLB) of phony peach disease is studied by vector surveys conducted at Alabama, Georgia, and South Carolina, USA during 1978-1981.

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