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(*Manihot esculenta* Crantz)

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Information and conclusions reported herein do not necessarily reflect the position of any of the aforementioned entities.

Abstracts on Cassava
(*Manihot esculenta* Crantz)

Vol. XIII **No. 1** **April, 1987**

CONTENTS

INTRODUCTION

This journal of analytical abstracts, which replaces the former combination of abstract cards and yearly cumulative volumes, is designed to provide a specialized guide to the world's literature on cassava (*Manihot esculenta* Crantz), disseminating research results and ongoing activities related to the crop.

The abstracts report condensed information from journal articles, booklets, mimeographed reports, theses, manuals and other conventional and nonconventional material, categorized into broad disciplinary fields to facilitate rapid scanning. Additionally, abstracts are author and subject indexed to enable more comprehensive consultation.

When retrospective or exhaustive coverage of a topic is desired, mechanized bibliographic searches of the entire document collection can be provided by CIAT's Documentation Center. Abstracts of all articles that match the topic of interest are provided to users who request this search service. The full text of every article abstracted by the Documentation Center is also available, through the photocopy service.

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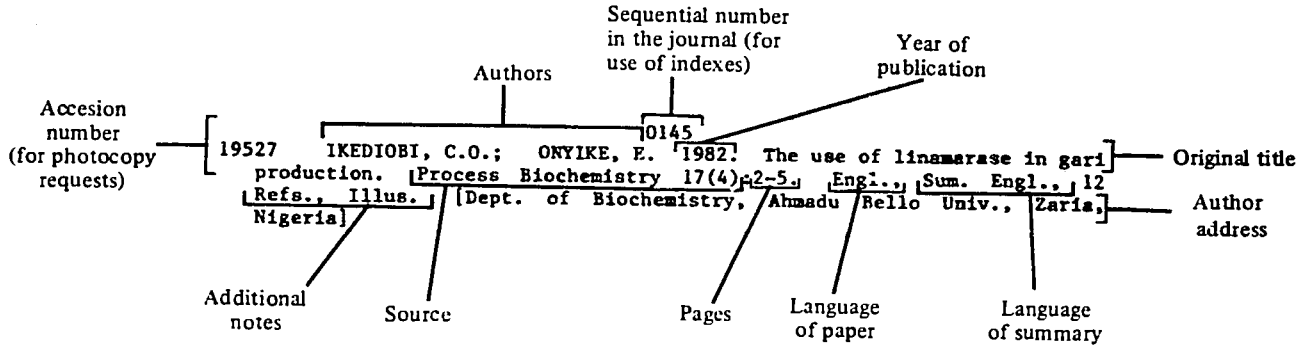
COMPONENTS OF AN ABSTRACT



Cassava. Linamarase. Uses. Gari. Fermentation. Detoxification processes. Enzymes. Nigeria.

Keywords

The detoxification of cassava associated with fermentation depends on endogenous linamarase hydrolysis of the constituent cyanogenic glucosides. Addition of exogenous linamarase preparations to fermenting grated cassava not only increased the rate and extent of detoxification but also consistently yielded gari with innocuous levels of cyanide. A preliminary screening of several fungal isolates for their ability to synthesize linamarase, resulted in the identification of 2 fungi, Penicillium steckii and Aspergillus sydowi, capable of producing this enzyme in commercial quantities. The use of linamarase or linamarase-producing fungi in cassava fermentation for gari production may be an interesting possibility. [AS]

Abstract

Abstractor and/or translator

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The last issue of the year contains cumulative author and subject indexes for the year.

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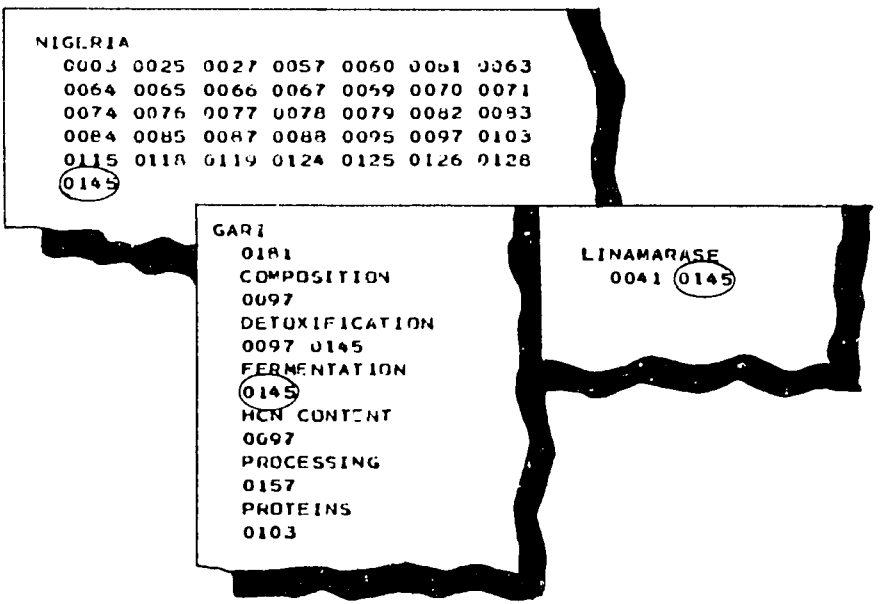

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001

26722 ALLEM, A.C. 1985. Collection of Manihot species in Brazil: third technical report. Rome, Italy, International Board for Plant Genetic Resources. 28p. Engl., 9 Refs., Illus. [Centro Nacional de Recursos Geneticos, Caixa Postal 102.373, 70.000 Brasilia-DF, Brasil]

Cassava. Cultivars. Sweet cassava. Bitter cassava. Ecosystems. Plant geography. Brazil.

A report of the 3rd field trip, conducted in July-Aug. 1985, to 6 Brazilian states (Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, and Bahia) to collect cassava landraces is presented. A total of 226 accessions were obtained of which 186 corresponded to cassava and 40 to wild Manihot species. Major observations are given as well as a general agricultural overview of each of the states visited. The Manihot species collected were M. caerulescens, M. epruinosa, M. esculenta, M. glaziovii, M. jacobinensis, and Manihot sp. (CIAT)

002

26135 BOSTER, J.S. 1984. Classification, cultivation, and selection of Aguaruna cultivars of Manihot esculenta (Euphorbiaceae). In Prance, G.T.; Kallunki, J.A., eds. Ethnobotany in the Neotropics. Symposium Society for Economic Botany, Oxford, Ohio, 1983. Proceedings. New York Botanical Garden. Advances in Economic Botany, no.1. pp.34-47. Engl., 11 Refs., Illus.

Cassava. Cultivars. Selection. Identification. Root productivity. Planting. Peru.

The results of field research on how the Aguaruna Indian community in the Peruvian Amazon basin classify, cultivate, and select cassava cv., are discussed. The maintenance of cassava genetic diversity depends on the cultural practices of the cultivators. Aguaruna selection of cassava cv. involves both unconscious selection for combinations of characters that allow the cv. to be perceptually distinguished and deliberate selection for desirable characters that affect the use of the plants. Yield is important but not determinant; the suitability of a cv. as a table vegetable or for beer making, storage qualities, and growth rate are other important selection criteria. Cv. are more commonly introduced through exchange. (CIAT)

003

26739 TRIANA, G. 1985. Los Puinaves del Inírida, formas de subsistencia y mecanismos de adaptación. (The Puinaves of Inírida; means of subsistence and adaptation mechanisms). Bogotá, Colombia, Instituto de Ciencias Naturales Biblioteca José Jerónimo Triana no.8. 122p.. Span., 67 Refs., Illus.

Cassava. Socioeconomic aspects. Cultivation systems. Small-scale processing . Human nutrition. Human health. Harvesting. History. Plant geography. Cassava products. Maps. Colombia.

Means of subsistence and adaptation mechanisms of the Puinave Indian community of the Inirida river, located in the eastern region of the Colombian Amazonian jungle, are analyzed. Slash and burn agriculture is practiced and cassava (one of the key crops) is the 1st to be planted. Twenty-eight different types of cassava are cultivated, especially for casave production. The cassava production system is briefly described. (CIAT)

004

26735 UGENT, D. ; POZORSKI, S.; POZORSKI, T. 1986. Archaeological manioc (Manihot) from coastal Peru. Economic Botany 40(1):78-102. Engl., Sum. Engl., 69 Refs., Illus. [Southern Illinois Univ., Carbondale, IL 62901, USA]

Cassava. History. Roots. Cassava starch. Cortex. Leaves. Stems. Cultivars. Peru.

Preserved remains of Manihot esculenta from 6 archaeological sites in the Casma Valley of Peru are illustrated and described. The combined collections from these sites total 197 pieces of root, 32 bark fragments, 22 pieces of stem, 4 capsules, and 2 leaf twigs. Based on radiocarbon assays, the specimens range in age from 1800 B.C. to A.D. 1532. This collection of sweet cassava is unique for its age, no., and wealth of different plant parts. A theory on the place of origin and time of domestication of these ancient cv. is given. (AS) See also 026 111

C00 PLANT PHYSIOLOGY

005

26813 CHOUDHURY, B.J. ; MONTEITH, J.L. 1986. Implications of stomatal response to saturation deficit for the heat balance of vegetation. Agricultural and Forest Meteorology 36(3):215-225. Engl., Sum. Engl., 14 Refs., Illus. [Hydrological Sciences Branch, NASA/Goddard Space Flight Center, Greenbelt, MD 20771, USA]

Cassava. Stomata. Transpiration. Climatic requirements. Water stress. Temperature. Leaves. Cariopy. USA.

The Perman-Monteith equation for transpiration from a uniform stand of vegetation was extended to include the response of stomata to the saturation deficit of air in the canopy. The implications for the relationship between transpiration rate and saturation deficit measured at some reference height above the stand, where the saturation deficit is assumed to be independent of the exchange of heat and vapor between the atmosphere and the surface, were examined. Calculations for arable crops (among them cassava) and for deciduous and coniferous forest species show the extent to which transpiration rate is overestimated when the stomatal response to saturation deficit and the vertical gradient of saturation deficit are ignored. (AS)

006

26377 RAMANUJAM, T. ; JOS, J.S. 1984. Influence of light intensity on chlorophyll distribution and anatomical characters of cassava leaves. Turrialba 34(4):467-471. Engl., Sum. Span., Engl., 10 Refs., Illus. [Central Tuber Crops Research Inst., Trivandrum 695 017, Kerala, India]

Cassava. Leaves. Plant physiological processes. Plant pigments. Photosynthesis. Cultivars. Chlorophyll. Stomata. India.

In field trials in 1982, cassava cv. M-4, H-165, H-1687, and H-2304 were grown in an open (normal light) area with a mean diurnal light intensity of 40,000 lx and in an artificially shaded area with a mean light intensity of 6000 lx. Shading significantly reduced specific leaf wt. and increased leaf area ratio. Leaf anatomical features of the high yielding H-165 and the low yielding M-4 were compared under the 2 light intensities. The spongy parenchyma layer was thicker in H-165 than in M-4 under normal light, but this layer was thinner under low light in both cv. Stomata of H-165 were more sunken than those of M-4 under normal light but were found on the surface in both cv. under low light. Under low light all 4 cv. had fewer stomata/unit leaf area than under normal light. Compared with

chlorophyll-a, chlorophyll-b increased significantly under low light. (Field Crop Abstracts)

007

27619 RAMANUJAM, T. ; INDIRA, P. 1978. Linear measurement and weight methods for estimation of leaf area in cassava and sweet potato. Journal of Root Crops 4(2):47-50. Engl., Sum. Engl., 12 Refs., Illus.

Cassava. Leaves. Leaf area. Cultivars. Experiment design. India.

The mathematical relationship between leaf area and linear measurement of leaves was established for rapid measurement of leaf area in cassava and sweet potato. The leaf factors for cassava are 0.44 and 0.62 for the var. having a length:width ratio of middle lobe from 2 to 5 and 5 to 9, resp. For sweet potato the leaf factors for nonlobed and multilobed var. are 0.45 and 1.24, resp. The leaf dry wt. was also positively correlated with leaf area. It is suggested that standardization is required at each stage of measurement since specific leaf wt. is influenced by var., age of the crop, and environmental conditions. (AS)

008

24745 ROCA, W.M. 1985. In vitro clonal propagation to eliminate crop diseases. In Inter-Center Seminar on International Agricultural Research Centers and Biotechnology, 1984. Biotechnology in international agricultural research: proceedings. Manila, Philippines, International Rice Research Institute. pp.3-10. Engl., Sum. Engl., 13 Refs., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Biotechnology. Clones. Virus inhibition. Tissue culture. Temperature. Diseases and pathogens. Disease transmission. Root productivity. Cultivars. Colombia.

The use of in vitro techniques to produce healthy plants and to restore crop yield and quality is discussed. Factors in disease elimination, such as virus strain to be eliminated, the size of explant for culture, and physical or chemical treatments applied to the infected plants or to the cultures, are briefly analyzed. Results from work with cassava and potato are also presented. Shoot-tip culture techniques used to recover healthy cassava and potato clones resulted in dramatic yield increases in several cassava cv. (Llanera and CMC 40). Changes in plant and leaf morphology accompanied yield increase in a local cassava cv. after in vitro propagation. (CIAT)

009

26732 VELTKAMP, H.J. 1986. Physiological causes of yield variation in cassava (Manihot esculenta Crantz). Netherlands, Agricultural University Wageningen Papers 85-6 (1985). 103p. Engl., Sum. Engl., Dutch., 151 Refs., Illus.

Cassava. Root productivity. Photosynthesis. Dry matter. Plant physiological processes. Plant development. Growth. Morphogenesis. Leaves. Cultivars. Temperature. Colombia.

The physiological causes of yield variation were studied in cassava cv. MCol 22 and MPtr 26. Rate of leaf photosynthesis was measured by infrared gas analysis and the photosynthetic rate was measured in the youngest fully expanded leaf of 35 to 45-day-old plants. MCol 22 had the highest photosynthetic rate and also the most efficient water use. Linear relationships were found between total DM yield and the amount of intercepted photosynthetically active radiation (PAR). Photosynthetic efficiency varied from 1.9 to 2.5 percent based on PAR during the 1st 6 mo. of the growth period, and decreased markedly in older plants. The fraction of incoming intercepted PAR varied from 43 to 69 percent during the 1st 6

mo. Cultivars had an extinction coefficient of 0.72 to 0.88 and their leaves were dominantly planophile. About 40 percent of a growth period of 1 yr had elapsed before complete ground cover was achieved. Genotypes with very different canopy characteristics reached a LAI of 3 in approx. the same time. The length of the period until 1st branching depended on genotype and planting date. Large genetic differences were found in leaf life, leaf size, plant age at which max. leaf size was reached, and leaf formation rate/apex. Small variations in environmental conditions caused significant differences in canopy characteristics. During the growth period of cassava, 2 periods with constant DM partitioning could be distinguished, with the apparent initiation of the filling of storage roots (AISR) being the crucial point. Genetic differences were found for efficiency of storage root production (ESRP) and AISR. The influence of daylength on growth and yield was studied. ESRP was negatively influenced by long days. Differences in ESRP were the main cause of differences in yield of storage roots for plants grown at different daylengths. MCol 22 is the 1st detected cassava clone whose yield of storage roots is nearly dayneutral and thus is suitable for cultivation at higher alt. (AS (extract)) See also 286

C01 Plant Development

010

25796 AZIZ, Z.A. 1984. Observations on the effect of low temperatures on floral induction in cassava (Manihot esculenta Crantz). MARDI Research Bulletin 12(1):102-106. Engl., Sum. Mal., Engl., 2 Refs. [Malaysian Agricultural Research & Development Inst., Serdang, Selangor, Malaysia]

Cassava. Temperature. Branching. Cultivars. Flowering. Fruits. Plant height. Malaysia.

Observations on flowering of cassava, conducted at high and low alt. in Malaysia, showed that clones Black Twig, Green Twig, C5, Medan, Jurai, and Betawi, which performed poorly and flowered late under lowland conditions, were observed to flower and fruit earlier when planted at 1000 m alt. It was noted that under these conditions vegetative growth is relatively slow. (Abstracts on Tropical Agriculture)

011

25797 COSTA, I.R. ; NASSAR, N.M.A.; PERIM, S. 1984. Padrao de crescimento de raízes e parte aérea de mandioca (Manihot esculenta, Crantz), em condicoes de Cerrados do Distrito Federal. (Growth patterns of roots and aerial parts of cassava in cerrado conditions of the Federal District). Turrialba 34(4):530-534. Port., Sum. Port., Engl., 10 Refs., Illus. [Centro de Pesquisa Agropecuária dos Cerrados, BR 20, Caixa Postal 70-0023, 73.300 Planaltina-DF, Brasil]

Cassava. Growth. Plant development. Root development. Leaves. Stems. Timing. Cultivars. Planting. Root productivity. Brazil.

In field trials in Planaltina (Brazil) in 1979-82, the growth of roots, leaves, and stems of cassava cv. IAC 352-7 (Jacana), Cavalo, Cacau-Vermelho, and Sonora grown from 20-cm stem cuttings planted 1 m apart were studied. Six plants/cv. were harvested every 2 mo. from 6 mo. to 2 yr. Highest root yields were obtained after 2 yr in Sonora (2.17 kg/plant), but after 18 mo. in other cv. (1.67-2.27 kg/plant). Highest yields of leaves and stems ranged from 0.93 kg/plant after 12 mo. in Sonora to 1.87 kg after 16 mo. in Cacau-Vermelho. (Field Crop Abstracts)

012

26714 ESTEVAO, E. DE M. 1971. Producao de raízes e de ramas e relacao entre caracteres da parte aérea e producao de raízes, em variedades de mandioca. (Root and branch production and the relationship between aerial

characteristics and root production in cassava varieties). Tese Mag.So. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 38p. Port., Sum. Port., 17 Refs., Illus.

Cassava. Root productivity. Branching. Cultivars. Stems. Leaves. Cortex. Pulp. Roots. Shoots. Harvesting. Plant height. Brazil.

A comparative study was carried out in Vicosa (Minas Gerais, Brazil) during the 1966-67 and 1967-68 crop years, regarding the behavior of 10 cassava var. differing in some characteristics, to determine root and aerial part production in plants with a complete growth cycle. The relationships between some characteristics of the aerial part and root production at harvest were verified. In the 1st trial, plant height, height of branching on the main stem, branch diameter at 5 cm above the ground, and wt. of aerial part and roots at harvest were determined; the data was adjusted to an appropriate regression equation. During both 1st and 2nd trials, 25-cm cuttings were planted on Aug. 23 and Sept. 1, resp., in 10-cm deep furrows, previously fertilized with 300 kg simple superphosphate/ha; rows were spaced at 1.0 m and plants at 0.5 m. Harvest took place the following year in Aug. when the plants were practically leafless under Vicosa conditions. Cassava var. showing higher root production capacity also produced a lower amount of branches, the opposite not necessarily being true. Var. under study were divided into 2 groups: (1) those showing higher root production capacity (Branca de Santa Catarina, Vassourinha-de-Vicosa, Chintinha, Barral, and Vassourinha Amarela), and (2) those showing lower root production capacity (Rosa or Cacau, Mata Fome, Pao-do-chile-I, and Pao-do-chile-II). Rio Negro was inferior to the others, with small root and branch production. The amount of roots produced was increasingly affected by the increase in wt. of the aerial part at harvest; root production was hardly affected by plant height, height of branching on the main stem, or branch diameter 5 cm above the ground. (AS-CIAT)

013

26391 KEATING, B.A. ; WILSON, G.L.; EVENSON, J.P. 1985. Effect of photoperiod on growth and development of cassava (Manihot esculenta Crantz). Australian Journal of Plant Physiology 12(6):621-630. Engl., Sum. Engl., 26 Refs., Illus. [Commonwealth Scientific & Industrial Research Organization, Division of Tropical Crops & Pastures, Cunningham Laboratory, 306 Carmody Road, St. Lucia, Qld. 4067, Australia]

Cassava. Photoperiod. Plant development. Growth. Rooting. Shoots. Dry matter. Translocation. Leaf area. Temperature. Harvest index. Cultivars. Timing. Australia.

Effects of photoperiod on growth and development of cassava were studied in controlled environments. Plants of cv. M Aus 7 and M Aus 10 were grown under short (10 h) and long (16 h) photoperiods and harvested at approx. weekly intervals for a period of 13 wk. Long photoperiods resulted in large increases in leaf area through increases in both no. (both cv.) and size of leaves (M Aus 7 only). The timing, extent, and anatomical characteristics of storage root initiation were similar for both cv. under 10-h and 16-h photoperiods but the subsequent balance between shoot and storage root growth strongly favored shoot growth in long days. DM partitioning followed a simple allometric pattern with the proportionality between the RGR of shoots and the RGR of storage roots remaining constant with time but being altered by photoperiod. In another expt. using M Aus 10, distribution to storage roots was quantitatively reduced with each additional 1-h increment from 10-h to 16-h photoperiods. A treatment consisting of a short day (10 h) plus a 1-h night break in the middle of the dark period produced growth similar to long-day treatment. Differences in cv. response (Ceiba, CMC 84, and M Aus 7) to a range of photoperiods

(11, 12, 13, and 14 h) were detected in a 3rd expt. The possible mechanisms and significance of these responses are discussed. (AS)

014

26375 RAMANUJAM, T. ; LAKSHMI, K.R. 1984. The pattern of dry matter production and partitioning in cassava. Indian Journal of Plant Physiology 27(2):138-144. Engl., Sum. Engl., 7 Refs., Illus. [Central Tuber Crops Research Inst., Trivandrum 695 017, Kerala, India]

Cassava. Plant development. Growth. Cultivars. Dry matter. Timing. Roots. Shoots. Root development. Developmental stages. India.

Fourteen cassava genotypes were studied for DM production and partitioning during different stages of growth. Partitioning of DM between tuber and shoot became constant in all the genotypes with the onset of tuber bulking. High positive correlations were noticed for accumulation of DM in shoots (r = 0.90) and storage roots (r = 0.93) in relation to total biomass produced. The harvesting efficiency was significantly higher in nonbranching and sparsely branching genotypes (58.8 percent) than in the profusely branching genotypes (47.1 percent). HI reached a plateau after 4th mo. stage. Selection indices were suggested for preliminary evaluation of genetic materials for yield. (AS)

015

26814 ZAMORA, O.B. ; WILSON, G.L.; FUKAI, S. 1984. Profiles of photosynthesis, solar irradiance and leaf area index at three seasonal stages of growth of cassava (Manihot esculenta Crantz) in the field. Philippine Journal of Crop Science 9(1):53-59. Engl., Sum. Engl., 28 Refs., Illus. [Dept. of Agronomy, College of Agriculture, Univ. of the Philippines, Los Baños, Laguna, Philippines]

Cassava. Photosynthesis. Leaf area. Growth. Plant development. Australia.

Profiles of net canopy photosynthesis at noon, determined by combining measurements of (12)CO2 exchange and (14)CO2 uptake, as well as solar irradiance and LAI were measured on 3 occasions during the growth period of cassava cv. MAus 7 in the field (SE Queensland, Australia). Interrelationships between these parameters were evaluated in the context of the overall efficiency of the canopy for photosynthesis. The difference in the photosynthetic rates between canopies lies mainly in the upper and middle layers where most CO2 fixation occurs. Profiles of photosynthesis suggest that for most of the season the cassava canopy is inefficient in the sense that lower leaves are underutilized or an unnecessary amount of shoots is produced in the upper layers. The inefficiency of the cassava canopy for photosynthesis was emphasized by comparing it with a more efficient canopy of sorghum. (AS) See also 005 034 038 045 049

CO2 Cyanogenesis

016

26727 RAMANUJAM, T. ; INDIRA, P.; RAJENDRAN, P.G. 1984. Distribution of HCN in cassava and its relationship with anthocyanin pigments. South Indian Horticulture 32(3):132-137. Engl., Sum. Engl., 11 Refs. [Central Tuber Crops Research Inst., Trivandrum-695 017, India]

Cassava. Cyanogenic glucosides. HCN content. Leaves. Petioles. Roots. Plant pigments. Cultivars. India.

A detailed correlation study was undertaken to (1) determine the relationship of anthocyanin with cassava root cyanide levels and (2) test the interrelationship for the distribution of HCN among leaf, petiole, and root parts. Forty-five cassava genotypes, comprising hybrids and exotic

and indigenous accessions maintained at the Central Tuber Crops Research Institute (Trivandrum, India), were used. The concn. of cyanogenic glucosides present in various plant parts varied broadly among the genotypes. In all the genotypes, the leaves contained higher HCN concn. and the amount of HCN present in the roots and petioles was significantly and positively correlated with leaf HCN. Though the anthocyanin content of the petiole showed a negative relationship with root HCN, the R(2) value is very low. Results suggest that the HCN potential of cassava roots can be predicted based on leaf HCN status. (AS)

C03 Chemical Composition, Methodology and Analyses

017

26845 BENZO, Z. ; SCHORIN, H.; VELOSA, M. 1986. Simultaneous quantitative determination of manganese, iron. copper and zinc by atomic absorption spectroscopy in tropical cereals, fruit and legume materials. Journal of Food Science 51(1):222-224. Engl., Sum. Engl., 11 Refs., Illus. [Inst. Venezolano de Investigaciones Cientificas, Apartado 1827, Caracas 1010-A, Venezuela]

Cassava. Minerals. Mn. Fe. Cu. Zn. Composition. Analysis. Venezuela.

A method for the simultaneous quantitative determination of Mn, Fe, Cu, and Zn in rice, maize, cassava, black beans, lettuce, mango, papaya, pineapple, medlar, bananas, and melon by atomic absorption spectroscopy was developed by using a mixture of concentrated nitric acid-sulphuric acid (2:1 vol./vol.) and by adding hydrogen peroxide for sample digestion. The precision varied between 1-10 percent. The accuracy was ascertained by analyzing 5 biological standard reference materials from the National Bureau of Standards (Washington D.C., USA) and no significant difference could be established between the certified values and those present in this study. Additionally, the results obtained by the presented method were compared with those obtained by X-ray fluorescence spectrometry in a different lab. With atomic absorption spectroscopy, cassava presented Mn, Fe, Cu, and Zn contents of 35.5 more or less 0.7, 69.0 more or less 3.0, 2.6 more or less 0.1, and 9.6 more or less 0.1 micrograms/g, resp., and with X-ray fluorescence spectrometry, values of 34.0 more or less 3.4, 71.0 more or less 3.4, 4.2 more or less 1.7, and 8.6 more or less 1.5 micrograms/g, resp. (AS)

018

26728 CLAUSSEN, W. ; LOVEYS, B.R.; HAWKER, J.S. 1985. Comparative investigations on the distribution of sucrose synthase activity and invertase activity within growing, mature and old leaves of some C3 and C4 plant species. Physiologia Plantarum 65(3):275-280. Engl., Sum. Engl., 39 Refs., Illus. [Inst. fur Obstbau und Gemusebau der Univ. Bonn, Auf dem Hugel 6, D-5300 Bonn, Federal Republic of Germany]

Cassava. Translocation. Leaves. Carbohydrate content. Sucrose. Growth. Enzymes. Nutrient uptake. Plant development. Biochemistry. Federal Republic of Germany.

Sucrose synthase and invertase activities were measured in leaves of 5 species (eggplant, cassava, grapevine, sugarcane, maize). In young growing leaves, sucrose synthase activity was highest in the leaf base in eggplant (cv. Mission Bell), cassava (cv. MAU S7), and grapevine (cv. Sultana), and in the leaf sheath in sugarcane (cv. NCO 310) and maize (cv. IOCHIEF). The results suggest that in growing leaves a close relationship might exist between sucrose synthase activity and the import of sucrose from source leaves. It is suggested that sucrose synthase may play an important role in the regulation of sucrose content of the conducting tissue. (AS (extract))

019

26838 DALGAARD, L. ; BRIMER, L. 1984. Electrochemical detection of cyanogenic glycosides after enzymatic post-column cleavage. Journal of Chromatography 303(1):67-76. Engl., Sum. Engl., 19 Refs., Illus. [Dept. of Chemistry BC, Royal Danish School of Pharmacy, Universitetsparken 2, DK-2100 Copenhagen O, Denmark]

Cassava. Cyanogenic glucosides. Linamarase. Linamarin. Hydrolysis. Laboratory experiments. Denmark.

Crude and partly purified extracts from Helix pomatia and linamarase from cassava were immobilized on columns packed with porous glass or silica and used as postcolumn reactors in the high-performance liquid chromatography of cyanogenic glycosides. When the efficiency of hydrolysis of concentrated solutions was measured, it was found that linamarase from cassava hydrolyzed linamarin completely, leaving other glycosides unaffected. NaOH (2 molar) was added to the flowstream after the enzyme reactor resulting in the formation of cyanide, which was then detected at a silver electrode by an amperometric measurement of 0 V with reference to a silver-silver chloride electrode. The selective detection of cyanide allows measurements in a complex matrix. The response is linear and the detection limit is in the low picomole range. (AS)

020

26731 GOMEZ, G. ; NOMA, A.T. 1986. The amino acid composition of cassava leaves, foliage, root tissues and whole-root chips. Nutrition Reports International 33(4):595-601. Engl., Sum. Engl., 23 Refs. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Nutritive value. Arginine. Lysine. Methionine. Threonine. Tyrosine. Valine. Leaves. Roots. Cassava chips. Feed constituents. Dry matter. Cultivars. Dried roots. Colombia.

Samples of leaves, foliage, root tissues (parenchyma and peel), and whole-root chips from 10-mo.-old plants of cassava cv. M Col 22 and M Col 1684 were analyzed for protein content and amino acid composition. Additional samples of whole-root chips from 10- to 12-mo.-old plants of cv. Llanera and CMC-84 were also analyzed. The av. protein contents, on an air dry basis, of leaf, foliage, root parenchyma, root peel, and whole-root chip samples were 22.2, 17.5, 3.2, 9.9, and 4.1 percent, resp. The amino acid profile of sun-dried cassava foliage compared favorably with that of sun-cured alfalfa meal. The low concn. of the S amino acids and the relative high content of arginine were the common features in all cassava samples analyzed. The amino acid composition of dried whole-root chips was lower than that of cereal grains commonly used for animal feeding. The presence of an unknown amino acid-like substance, probably the result of some interaction between root peel and parenchyma components, was detected. (AS)

021

26393 RICKARD, J.E. 1986. Tannin levels in cassava, a comparison of methods of analysis. Journal of the Science of Food and Agriculture 37(1):37-42. Engl., Sum. Engl., 24 Refs. [Tropical Development & Research Inst., 56-62 Gray's Inn Road, London WCIX 8LU, England]

Cassava. Tannins. Composition. Nutritive value. Enzymes. Cassava meal. Pellets. Cassava chips. Gari. Human health. United Kingdom.

Low levels of tannins (proanthocyanidins) have been detected in dried cassava samples using standard methods of analysis based on extraction procedures. A direct vanillin assay method was compared with other direct methods of analysis based on acid hydrolysis and protein precipitation. The specificity of the methods is discussed in relation to the levels of tannins detected and their potential biological activity in freeze-dried

fresh and dried/processed cassava samples. The results are discussed with respect to the amount of indigestible material present in the samples. The results of these expt. indicate that tannins present in dried/processed cassava products may be a factor limiting their nutritional value. (AS)

022

26869 SOARES, L.M.V. ; RODRIGUEZ-AMAYA, D.B. 1985. Screening and quantitation of ochratoxin A in corn, peanuts, beans, rice, and cassava. Journal of the Association of Official Analytical Chemists 68(6):1128-1130. Engl., Sum. Engl., 21 Refs. [Univ. Estadual de Campinas, Faculdade de Engenharia de Alimentos e Agricola, Caixa Postal 6121, 13.100 Campinas-SP, Brasil]

Cassava. Laboratory experiments. Analysis. Ochratoxin. Cassava flour. Brazil.

To answer the need for simple, economical, and rapid methods for mycotoxins, a procedure for screening and quantitation of ochratoxin A was developed. A methanol-aqueous KCl extraction is used, followed by cleanup with clarifying agents and partition into chloroform. Part of the chloroform extract is used for screening and the other part for quantitation by TLC. The screening procedure takes 40 min, using a silica gel/aluminum oxide minicolumn developed for this purpose. The limits of detection are 80 and 10 micrograms/kg, resp., for minicolumn screening and TLC quantitation. Ammonium sulfate is efficient in cleaning samples of maize and cassava. Tests were conducted on triplicate spiked samples of yellow maize meal, raw peanuts, dried black beans, polished rice, and CF at different levels (400, 200, 80, 40, and 10 micrograms/kg). Recoveries ranged from 86 to 160 percent and the C.V. ranged from 0 to 26 percent. (AS) See also 025 132

C04 Plant Nutrition

023

26365 KANWAR, J.S. ; YOUNGDAHL, L.J. 1985. Micronutrient needs of tropical food crops. Fertilizer Research 7(1):43-67. Engl., 90 Refs., Illus.

Cassava. Nutrient uptake. Zn. Cu. Mn. B. Fe. Mo. Mycorrhizae. Translocation. Root productivity. Fertilizers. N. P. K. Soil impoverishment. United Kingdom.

Research conducted on micronutrient needs of tropical food crops is reviewed. The role of micronutrients (Cu, Mo, Fe, Zn, Mn, and B) in crops is discussed. A brief reference to cassava is made regarding a lime and micronutrient trial conducted by CIAT in Colombia where high levels of liming induced Zn deficiency and reduced the uptake of Mn, Cu, and B. Cassava removes 200 g Fe, 75 g Mn, 25 g B, 75 g Zn, and 8 g Cu/t DM. General research needs on the topic are indicated. (CIAT)

024

26363 LIAN, T.S. ; CHAN, S.K.; HASSAN, M.I. 1983. The relationship between potassium uptake and yield of cassava as influenced by branching. MARDI Research Bulletin 11(2):233-236. Engl., Sum. Mal., Engl., 4 Refs., Illus. [Malaysian Agricultural Research & Development Inst., Serdang, Selangor, Malaysia]

Cassava. Plant assimilation. K. Branching. Leaves. Root productivity. Cultivars. Malaysia.

Fifteen cassava var. differing in branching pattern, fresh root yield, and tuber starch content were planted in a randomized complete block design with 3 replicates to study the relationship between K uptake and cassava

yield. Efficiency of K uptake as reflected by leaf K content had positive relationships with fresh root and starch yields in unbranched cassava. In branched forms, however, high K uptake depressed yield. Although DM production was enhanced by efficient K uptake, the dominating top growth of branched forms probably influenced the partitioning of these assimilates in its favor, thus restricting root storage and yield. (AS)

025

26712 PINHEIRO, S.L.G. ; ANJOS, J.T. DOS; TERNES, M.; MONDARDO, E. 1985. Levantamento nutricional da mandioca em solos de Santa Catarina. (Nutritional evaluation of cassava in Santa Catarina soils). Florianópolis-SC, Brasil, Empresa de Pesquisa Agropecuaria de Santa Catarina. Pesquisa em Andamento no.38. 7p. Port., 8 Refs. [Empresa de Pesquisa Agropecuaria de Santa Catarina, Caixa Postal D 20, 88.000 Florianópolis-SC, Brasil]

Cassava. Nutritive value. Leaves. Soil analysis. Cultivars. Root productivity. Timing. N. P. K. Minerals. Brazil.

Leaf samples of cassava cv. Mico, Aipim Gigante, and Mandim Branca were taken for chemical analysis as well as samples from 3 different low-P, acid soils to characterize the nutritional status of cassava on the main soil types found in Santa Catarina (Brazil). The OM, pH, exchangeable K, Al, and Ca + Mg, and available P, Fe, Mn, Zn, and Cu values varied for the different soils. Comparing the critical levels of major nutrients and micronutrients established for cassava and those obtained from the analyzed leaf samples, it was found that with few exceptions P, Ca, Mg, Fe, Cu, and B were within normal levels. N levels were generally low, K levels were low at 2 sites, Zn levels were low, and Mn levels were well above the normal for all sites. The results suggest that N, K, and Zn are generally deficient while Mn is in excess. A low correlation was observed between soil and leaf nutrient levels, and between these and cassava production. Further studies are recommended, especially in Ararangua soils where cassava yields were lower. (CIAT) See a 014 029 037

D00 CULTIVATION

D01 Soil, Water, Climate and Fertilization

026

26777 CARTER, S.E. 1986. Climatic and edaphic classification at a continental scale (1:5,000,000) for cassava in South America. Cali, Colombia, Centro Internacional de Agricultura Tropical. Agro-Ecological Studies Unit. 17p. Includes 4 maps. Engl., 24 Refs., Illus.

Cassava. Climatic requirements. Soil analysis. Maps. Colombia. South America. America.

The different environments (combinations of climatic and edaphic conditions) in which cassava is grown in South America are classified, and the most probable differences between one agroecozone and the next based on environmental factors affecting the cassava plant are presented. A hierarchical approach is used for soil and climate classifications. Specific maps for climates, soils, and a combination of climate-soil homologues for cassava in South America are presented as well as a map of cassava distribution. (CIAT)

027

26749 GONZALEZ, V.W. 1981. Effect of fertilization and plant density on root yield of cassava (Manihot esculenta Crantz). Davis, University of California. 27p. Engl., 5 Refs., Illus.

Cassava. Fertilizers. Root productivity. Nutritional requirements. N. P. K. Spacing. Planting. Cultivars. Cassava programs. Mexico.

The effects of varying levels of NPK at different plant densities 7500, 10,000, 12,500, and 15,000 plants/ha) on the root yields of cassava cv. M Mex 59 were determined and the selected var. was compared with the local cv. Ceiba in Huimanguillo (Tabasco, Mexico), using the Plan Puebla matrix design. Fertilizer levels were 0, 30, 60, and 90 kg N; 60, 90, 120, and 150 kg P; and 30, 60, 90, and 100 kg K/ha. There were a total of 25 treatment combinations. The local cv. Ceiba yielded the same as M Mex 59 at the highest plant density with the application of 60-120-90 kg NPK/ha. The max. cassava yield (27 MT/ha) was obtained with 60 and 90 kg N and P/ha, resp. The levels of the factors were not adequately chosen; thus future studies should correctly manipulate them to use the Plan Puebla matrix design successfully. (CIAT)

028

26750 GONZALEZ, V.W. 1981. Project: regression analysis on the effect of fertilization and plant density on root yield of cassava (Manihot esculenta Crantz). Davis, University of California. 16p. Engl., Illus.

Cassava. Root productivity. Fertilizers. Nutritional requirements. N. P. K. Shoots. Spacing. Plant height. USA.

Based on data of a previous expt., a regression model was developed to (1) relate cassava fresh root yield to N and P contents and to plant density; (2) determine the effect of K; and (3) relate top yield, plant height and no., and root length and diameter to the variables in (1) and to fresh root yield. The equations with the best fit for fresh root yield, as a function of NPK and plant density, included N as a square variable and P, K, and plant density as simple or interacted variables. The observed max. fresh root yield is likely to be due to N and not N + P as was 1st observed. N apparently alters the functional balance of shoots to roots since it is not as important a squared variable in the regression equation that relates top yield to the studied variables. (CIAT)

029

26899 HOWELER, R.H. 1986. Potassium nutrition of cassava. In Munson, R.D., ed. International Symposium on Potassium in Agriculture, Atlanta, Gainesville, 1985. Madison, Wisconsin, U.S.A., American Society of Agronomy. pp.819-841. Engl., Sum. Engl., 110 Refs., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. K. Absorption. Root productivity. Plant tissues. Plant development. Growth. Ca. Mg. Mineral deficiencies. Soil requirements. Soil fertility. Fertilizers. Timing. Carbohydrate content. Colombia.

A literature review is given on K nutrition of cassava, covering aspects of K absorption during the growth cycle; effect of cassava production on soil fertility; K concn. in cassava tissue; effect of K supply on growth and K uptake; interaction between K, Ca, and Mg; diagnosis of K deficiency; cassava response to K application; and effect of K on root quality. Most reports in the literature indicate significant responses of cassava to application of 50-150 kg K/ha, but in some cases responses have been obtained to levels as high as 400 kg K/ha. At these high levels of K application, there is a possibility of inducing Mg deficiency because cassava appears to reduce Mg absorption at high levels of K supply; K-induced Ca deficiency is much less likely. All K should be applied at or shortly after planting and in split applications only at low rates. For diagnosing K deficiency, one should sample the youngest fully expanded blades of plants that are 3-4 mo. old; a K(+) concn. of less than 13-15 g/kg in this tissue indicates K deficiency and a likely response to K

application. Similarly, when the level of exchangeable K(+) in the soil is less than 0.15-0.17 cmol/kg, a K response can be expected. (AS (extract))

030

25788 HOWELER, R.H. ; GUZMAN, S. 1985. Prácticas de conservación de suelo en explotaciones agropecuarias en ladera. (Soil conservation practices on hillside ranches and farms). In Congreso Colombiano de Cuencas Hidrográficas, 3o., Cali, Colombia, 1985. Memorias. Cali, Centro Internacional de Agricultura Tropical. pp.208-239. Span., 18 Refs., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Soil conservation practices. Cultivation systems. Mulching. Weeding. Intercropping. Drainage. Ecosystems. Soil fertility. Soil requirements. Soil physical properties. Colombia.

The factors influencing soil erosion and soil conservation practices in annual crops, with special reference to cassava and cattle raising in hilly areas of Colombia, are discussed. In Mondomo, Cauca, soil erosion in cassava crops was markedly reduced by applying maize mulch and by planting Brachiaria humidicola between double rows of cassava. With the latter practice, however, cassava yields were reduced due to the competition exerted by the grass. In Agua Blanca, Cauca, the most effectivo treatment was zero tillage and weed control using hoes. In Las Pilas, Cauca, zero tillage, fertilization, and the use of live barriers were effective. To avoid soil erosion in hilly areas, the best control is obtained by intensive crop management--fertilization, high plant densities, intercropping, min. tillage, disease and pest control, live barriers, and soil mulches. (CIAT)

031

25787 HOWELER, R.H. 1984. Prácticas de conservación de suelos para cultivos anuales. (Soil conservation practices for annual crops). In _____., ed. Seminario sobre Manejo y Conservación de Suelos, Cali, Colombia, 1984. Manejo y conservación de suelos de ladera: memorias. Cali, Colombia. pp.77-93. Span., 13 Refs., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Soil conservation practices. Soil fertility. Mulching. Intercropping. Drainage. Planting. Ploughing. Soil physical properties. Colombia.

The factors influencing soil erosion and the most efficient practices to counteract this phenomenon in annual crops, using cassava as an example, are discussed. The equation A = R x K x L x S x C x P is used to explain the factors influencing soil erosion, in which A = soil losses due to erosion; R = rainfall; K = soil; L and S = slope length and gradient; C= crop management; P = conservation practices. Exptl. results obtained in Mondomito and Agua Blanca (Cauca, Colombia), where the effects of different cultural practices in cassava on soil erosion were studied, are briefly discussed. To increase annual crop yields in hilly regions and to reduce soil erosion, recommendations are to apply adequate fertilizers, use adapted, high-yielding var., control pests, diseases, and weeds, use min. soil tillage, plant across the contour, use live grass barriers and soil mulches. (CIAT)

032

22044 HOWELER, R.H. ; SIEVERDING, E. 1983. Potentials and limitations of mycorrhizal inoculation illustrated by experiments with field-grown cassava. Plant and Soil 75(2):245-261. Engl., Sum. Engl., 45 Refs., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Mycorrhizae. Inoculation. P. Glomus manihotis. Root productivity. Cultivars. Fertilizers. Colombia.

Field inoculation trials with cassava were conducted in Quilichao (typic Dystropept soil) and Carimagua (Haplustox soil), Colombia. In Quilichao, with a large and effective native vesicular-arbuscular mycorrhizal (VAM) population, inoculation with Glomus manihotis did not increase cassava yields significantly, neither when different sources and levels of inoculum material were used, nor with different cassava cv., or after stabilizing soil temp. through mulching. Field inoculation did result in a decrease of the C.V. with respect to yield. The high dependency of cassava on an effective VAM association was indicated by a marked decrease in yield after eradication of native VAM by soil sterilization. In Carimagua, with a lower native VAM population, mycorrhizal inoculation with G. manihotis increased yields significantly at intermediate levels of 100 kg applied P/ha, using either inoculum of cassava or Panicum maximum roots or inoculum of a soil-root mixture of maize or Pueraria phaseoloides. Higher or lower levels of P decreased the effect of inoculation on yield. There were no significant differences among P sources, ranging from highly soluble triple superphosphate to low solubility rock phosphates. Inoculation with different VAM isolates had a variable effect on cassava yields, and showed that there may be an interaction between P fertilizer level and isolate efficiency. It is concluded that there may be a potential to increase yields or decrease the fertilizer P requirements of cassava through field inoculation with effective VAM isolates, in the vast areas of acid infertile Oxisols and Ultisols with low native VAM fungal populations, represented by Carimagua. (AS)

033

21493 INSTITUT DE RECHERCHES AGRONOMIQUES TROPICALES ET DES CULTURES VIVRIERES. 1981. Le manioc en culture pure. (Monocropped cassava). In _____. Rapport analytique études des systeres de production potentiels a base de riz pluvial, 1979-1980. Paris. Convenio EMAPA/IRAT. v.3,pp.438-465. Fr., [Inst. de Recherches Agronomiques Tropicales et des Cultures Vivrieres, 110 rue de l'Univ., 75.007, Paris, France]

Cassava. Cultivars. Plant breeding. Root productivity. Rice. Fertilizers. N. P. K. Starch productivity. Nutritional requirements. Brazil.

Information is given on var. improvement, fertilization, weed and insect control, and entomology of potential cassava-rice production systems. The exptl. conditions, var., and maintenance measures are described and comparative data are given on starch content, wt. of aerial part and roots, yield, variance analysis, effect of herbicides, and weeds. Traditional var. were found to be highly productive without the addition of manure; they do not need NPK fetilizer when grown in rotation with upland rice. Fluormeturon was persistent at low application rates. On the other hand, traditional var. showed low disease susceptibility and during the 2-yr rotation, the effect of insects was nil. It is recommended that the Brazilian PROALCOOL project be activated through traditional cultivation systems such as crop rotation and subsistence cropping to avoid the risks involved in sole cropping cassava (low yields and diseases, among others). (CIAT)

034

26362 KRUTKUN, T. 1984. Effects of lead nitrate and lead oxide added into Map Bon sandy loam soil on growth of cassava. Kasetsart Journal 18(3):149-152. Thai., Sum. Engl., Thai., 15 Refs.

Cassava. Soil amendments. Growth. Thailand.

Application of lead nitrate up to 400 ppm Pb or lead oxide up to 2000 ppm Pb to Map Bon sandy loam soil did not cause any damage to cassava. (AS)

035

26713 MONDARDO, E. ; ANJOS, J.T. DOS; BACHA, R.E. 1986. Epocas de aplicacao de fertilizantes na cultura da mandioca em solo Araranguá. (Fertilization dates for cassava on Araranguá soils). Florianópolis-SC, Brasil, Empresa de Pesquisa Agropecuaria de Santa Catarina. Pesquisa em Andamento no.57. 5p. Port., 2 Refs. [Empresa de Pesquisa Agropecuaria de Santa Catarina, Estacao Experimental de Urussanga, Caixa Postal 49, Urussanga-SC, Brasil]

Cassava. Fertilizers. Soil analysis. Root productivity. Starch productivity. Timing. N. P. K. Brazil.

A trial was conducted to determine the best NPK fertilization dates of cassava cv. Aipim Gigante in a low fertility sandy soil with low OM content, of Araranguá (Santa Catarina, Brazil). NPK was applied in different combinations. The highest av. root yield (22.2 t/ha) and the highest starch content (32.5 percent) for the 1-cycle crop were obtained when 25-30-40 NPK was applied 45 days after planting, followed by 25-0-0 NPK 75 days after planting. In the 1-cycle crop all fertilization dates gave higher root yields than the unfertilized control. In the 2-cycle crop, the best root yield (25.2 t/ha), from an economic point of view, was obtained when 5-15-20 and 20-0-0 NPK were applied during the 1st cycle at planting and 45 days after planting, resp., and 25-15-20 NPK during the 2nd cycle at 45 days after germination. (CIAT)

036

26744 PINTUKANOK, A. ; TONGYAI, C. 1985. An economic evaluation of land degradation through crop nutrient removal by cassava, sugar cane and maize. Thai Journal of Agricultural Science 18(1):37-51. Engl., Sum. Engl., 8 Refs., Illus. [Office of the National Environment Board, Phayathai, Bangkok 10400, Thailand]

Cassava. Economics. Harvesting. Soil impoverishment. Nutrient uptake. Sugarcane. Maize. N. P. K. Costs. Ecology. Thailand.

An economic evaluation is made of soil nutrient loss as affected by the growing export demand of maize, cane sugar, and cassava products. Special consideration is given to the fertilizer compensation requirement. Unfertilized plant samples were analyzed for N, P, and K removal; fertilized plant samples were also analyzed but only to assess the effects of fertilizer application at the recommended rate. Results show that NPK contents were greater in maize grains than in cassava roots or sugarcane millable portion, and that the exportation of maize products has led to the greatest soil nutrient loss. Compensating for the loss through the application of fertilizer is essential in order to prevent further decline in soil fertility. It is suggested that the value of lost soil nutrients should be considered in terms of fertilizer cost required for compensation and should be added to the primary value of these products. The 13-yr av. shows that the equivalent fertilizer loss values of cassava roots, sugarcane, and maize grain were 4.4, 8.0, and 17.23 percent, resp. (AS)

037

26809 PORTIELES, M. ; RUIZ, L.; SANCHEZ, E. 1983. Estudio del consumo y los coeficientes de aprovechamiento de los fertilizantes y el suelo en el cultivo de la yuca (Manihot esculenta). (Study of consumption and uptake coefficients for fertilizer and soil nutrients in cassava cultivation). Ciencia y Técnica en la Agricultura. Viandas Tropicales 6(1-2):85-99. Span., Sum. Span., Engl., 16 Refs. [Centro de Mejoramiento de Semillas Agámicas, Santo Domingo, Villa Clara, Ministerio de la Agricultura, Ciudad de La Habana, Cuba]

Cassava. Roots. Stems. Fertilizers. Composition. Root productivity. Harvesting. Soil fertility. Fibre content. Soil requirements. N. P. K. Cuba.

The coefficients of fertilizer and soil nutrient uptake by cassava clone Señorita were determined on a brown carbonated soil with 3.15 and 38.20 g P and K/100 g of soil, resp., at the Centro de Mejoramiento de Semillas Agámicas (Villa Clara, Cuba) in 1981. A randomized block design was used with 4 replications and 5 treatments: (1) control, (2) PK, (3) NK, (4) NP, and (5) NPK; N, P, and K were applied at 120.5, 67.0, and 221.3 kg/ha, resp. A relationship was found between stem uptake (111.6, 24.0, and 103.4 kg NPK/ha, resp.) and the highest canopy yield (6.36 t/ha). Likewise, the highest N uptake by roots (68.25 kg/ha), obtained with treatment 4, was related to the highest level of N utilization by the canopy. On the other hand, the highest P and K uptakes (15.15 and 85.86 kg/ha, resp.) were observed with treatment 5 and the lowest, for both canopy and roots, with the control. The crop did not benefit from NPK fertilization, and a depressive effect was observed. A high utilization coefficient (70.9 percent) for soil P was also found. Treatment 5 produced the highest cassava yields. (AS)

038

26863 PORTIELES, M. ; RUIZ, L.; SANCHEZ, E. 1983. Influencia de la fertilización sobre la semilla y su efecto en los rendimientos de la yuca (Manihot esculenta). (Effect of fertilization on cassava cuttings and on yields). Ciencia y Técnica en la Agricultura. Viandas Tropicales 6(1-2):25-37. Span., Sum. Span., Engl., 16 Refs., Illus. [Centro de Mejoramiento de Semillas Agámicas, Santo Domingo, Villa Clara, Ministerio de la Agricultura, Ciudad de La Habana, Cuba]

Cassava. Fertilizers. N. P. K. Root productivity. Plant height. Plant development. Growth. Rainfall data. Cuba.

At the Centro de Mejoramiento de Semillas Agámicas (Villa Clara, Cuba), a study was carried out on a brown carbonated soil with 4.6 mg P and 40.5 mg K/100 g soil, using cuttings from cassava clone Señorita, grown on plots with fertilization patterns as follows: check, PK, NK, NP, and NPK, where N was applied at 120.7 kg/ha, P at 67.0 kg/ha, and K at 221.3 kg/ha. A random block design with 4 replications was used. The highest cutting dry wt. was noted in cuttings from the NP treatment (8.36 t/ha), whereas the lowest was that from the check treatment (4.10 t/ha). For N, P, and K uptake, cuttings showed a similar pattern as compared with the dry wt. measurements, being 111.66, 24.09, and 103.45 kg N, P, and K/ha, resp., for the NP treatment. There were no significant differences for root yield between treatments. Further research on the subject is recommended. (CIAT)

039

26374 POTTY, V.P. 1985. Cassava as an alternate host for multiplication of VAM fungi. Plant and Soil 88(1):135-137. Engl., Sum. Engl., 7 Refs. [Indian Agricultural Research Inst., Regional Station, Rajendranagar, Hyderabad 500 030, India]

Cassava. Mycorrhizae. Inoculation. Cortex. Roots. India.

The use of cassava as an alternate host for the multiplication of vesicular-arbuscular mycorrhizae (VAM) fungi for mass inoculation in the field was investigated. In a 1st test with VAM fungi found embedded in between the layers of cassava root peels, high infection of the VAM fungi inoculated with cassava peels was recorded; there were no significant differences between the treatments cassava peeling alone and cassava peeling + lignite slurry, both at inoculum concn. of 1 and 10 g/plant. In a 2nd test, VAM strains isolated from sweet potatoes and yams were found to infect cassava in a similar way as the cassava strain. The response of cassava to a coleus strain was comparatively less, and a nonindigenous culture of Glomus mossae was also able to infect cassava plants more efficiently than the native strain. The phenomenon of nonspecificity of

cassava to various VA fungi and the prevalence of the fungus in the peels can be of use in the mass multiplication of efficient strains. (CIAT)

040

24057 SANCHEZ DE PRAGER, M. ; SIEVERDING, E. 1984. Estudio de la fitosanidad de inóculos de micorriza vesiculo-arbuscular (MVA). (Studies on the sanitary condition of vesicular-arbuscular mycorrhiza inoculum). Suelos Ecuatoriales 14(1):149-157. Span., 12 Refs., Illus. [Univ. Nacional de Colombia, Apartado Aéreo 237, Palmira, Colombia]

Cassava. Mycorrhizae. Inoculation. Soil requirements. Lactic acid. Soil fertility. Fertilizers. Fusarium. Rhizoctonia. Roots. Colomoia.

A methodology to determine the sanitary condition of vesicular-arbuscular (VA) mycorrhizal inoculum, especially regarding the association mycorrhiza-pathogenic fungi, was investigated using 100 kg-pots with Quilichao (Colombia) soil inoculated with the VA mycorrhiza Glomus manihotis; the following host plants were used: cassava, Pueraria phaseoloides, Desmodium ovalifolium, Stylosanthes capitata, P. phaseoloides/maize, and D. ovalifolium/maize. Three types of inoculum were collected from each host: (1) soil infested by VA mycorrhiza (soil + roots), (2) infected roots, and (3) VA mycorrhiza spores. The following culture media were studied to isolate non-mycorrhizal fungi: PDA-25 percent lactic acid, soil-agar extract + antibiotics, PDA + antibiotics, and PDA-25 percent lactic acid + antibiotics. The best media to identify non-mycorrhizal fungi from soil infested by VA mycorrhiza were soil-agar extract + antibiotics and PDA-25 percent lactic acid + antibiotics. PDA-25 percent lactic acid was successful for infested roots and spores. Fusarium sp. and Rhizoctonia sp., pathogenic to cassava, were found associated with the VA mycorrhizal inoculum. Pathogenicity tests of VA mycorrhiza-infested soil indicated that there was an apparent balance between fungal populations, thus preventing root pathogen attacks. Pathogen-free VA mycorrhizal inoculum should be used. To produce inoculum on a large scale it is necessary to identify (1) agrochemicals that will selectively control pathogens without inhibiting mycorrhizae and (2) hosts with a high capacity to multiply mycorrhizae and exclude specific pathogens. (CIAT)

041

26709 SAROBOL, E. ; ROJANARIDPICHED, C.; JIAMJAMNANJA, J.; VICHUKIT, V.; SAENGKAEWSOOK, W. 1984. Yield response of cassava to low rate of fertilizer. Kasetsart Journal 18(2):68-71. Thai., Sum. Engl., Thai., 5 Refs.

Cassava. Root productivity. Fertilizers. N. P. K. Thailand.

The recommended fertilizer rate of cassava in Thailand is 50-50-50 kg NPK/ha; however, farmers apply fertilizer at a much lower rate than that recommended. Past fertilizer trials have used high fertilizer rates that are beyond the reach of the farmers. Research was conducted at Sriracha Research Station in Cholburi from 1978 to 1981 to determine the yield response of cassava to a low fertilizer rate (0.25, 0.50, 0.75, and 1.00 the recommended rate) when grown in a sandy loam of Sattahip Series, a typical soil of the cassava-growing area of eastern Thailand. Av. yield increases with fertilizer application were 15, 21, 24, and 34 percent, resp. (AS) See also 002 010 023 025 057 070

D02 Cultivation Practices: Propagation, Planting, Weed Control and Harvesting

042

25795 ALCANTARA, E.N. DE ; CARVALHO, D.A. DE 1983. Plantas daninhas em mandiocais (Manihot esculenta Crantz) na regiao mineradora de Diamantina (Alto Jequitinhonha), Minas Gerais. (Weeds in cassava in the mining

district of Diamantina (Alto Jequitinhonha), Minas Gerais). Planta Daninha 6(2):138-143. Port., Sum. Port., Engl., 18 Refs., Illus. [Empresa de Pesquisa Agropecuária de Minas Gerais, 37.200 Lavras-MG, Brasil]
Cassava. Weeds. Brazil.

A survey was carried out in the municipalities of Carbonita, Itamarandiba, and Capelinha, considered to be representative of the mining region of Diamantina (Minas Gerais, Brazil). Results showed the occurrence of 45 weed species belonging to 19 families, consisting of 16 dicotyledons, 2 monocotyledons, and 1 pteridophyte. Compositae, Gramineae, Malvaceae, Leguminoseae, Rubiaceae, and Convolvulaceae were the most frequently occurring families. The most frequent species were Acanthospermum australe, Sida rhombifolia, and Ferreria alata. (AS (extract))

043

26720 CABALLERO M., C.A. ; RODRIGUEZ, J.R.; GONZALEZ, A.; CARBALLO, A.; ORTIZ, R. 1986. Evaluación de cuatro variedades de mandioca y tres distanoias de siembra. (Evaluation of four cassava varieties and three planting distances). Caazapá, Paraguay, Ministerio de Agricultura y Ganadería. Servicio de Extensión Agrícola Ganadera. 17p. Span., Sum. Span., 5 Refs.

Cassava. Cultivars. Planting. Spacing. Root productivity. Paraguay.

Four early-maturing cassava var. (Konche Guazú, Konche-í, Kachará, and Pomberí) were evaluated at 3 planting distances (50, 75, and 100 cm between plants) to identify the main characteristics of the var. and the planting distances at which they have the highest yield potential. These var. are the most commonly cultivated in the districts of Caazapá, Maciel, and Fulgencio Yegros (Peru). Traditional technology was used. The trial was installed in Sept. 1984 and harvest took place 9 mo. later. Each trial was made up of 3 blocks; each block was divided into 12 plots where the 4 var. were distributed completely at random at 3 planting distances. The highest yielding var. was Konche Guazú, followed by Konche-í. The planting distance of 50 cm between plants was statistically better than the one used by the farmer, yielding 45 percent more, but with small roots. In 1 locality, var. Konche Guazú decreased its yield due to lodging. Var. Kachará showed susceptibility to root rot. Var. Konche-í had the best starch yield (35 percent). (AS-CIAT)

044

26848 CATAÑO C., M.L. 1986. Evaluación de la estabilidad fenotípica de una variedad de yuca (Manihot esculenta Crantz) propagada vegetativamente por diferentes métodos. (Evaluation of phenotypic stability of a cassava variety vegetatively propagated by different methods). Tesis Biólogo (Botánico). Cali, Colombia, Universidad del Valle. 96p. Span., Sum. Span., Engl., 65 Refs., Illus.

Cassava. Cuttings. Apical meristems. Propagation. Germination. Root productivity. Harvesting. Roots. Plant anatomy. Plant tissues. Plant breeding. Plant development. Morphogenesis. Dry matter. Colombia.

The phenotypic stability of plants of cassava var. M COL 1505, obtained from cuttings (control), sprouts, meristem culture, in vitro conservation, and somatic embryogenesis, was assessed. Using the techniques developed at CIAT, the plants obtained from meristems, in vitro conservation, and somatic embryos were propagated in vitro in order to increase the amount of vegetative material. Plants obtained from cuttings and sprouts, used as controls, were propagated vegetatively in situ. Phenotypic evaluation was carried out at 6 and 10 mo. from planting in the field and an electrophoretic isoenzyme analysis was conducted using young roots from sprouts obtained from cuttings at harvest. Cutting-propagated plants differed from plants obtained from sprouts regarding quantitative

characters. Meristem-propagated plants showed the highest phenotypic stability, with root fresh wt. and HI superior to control plants, though not significantly different. Plants from in vitro conservation varied significantly regarding qualitative plant characters, but this variation did not affect root yield. Plants obtained by somatic embryogenesis differed significantly from the control plants in both qualitative and quantitative characters. The electrophoretic isoenzyme analysis did not show any variation in the isoenzyme banding pattern for the 5 propagation systems. The changes observed in the phenotypic characters can be attributed to physiological differences, associated to the induction of a juvenil stage, caused by the in vitro culture. (AS)

045

26132 CORAL C., J.C. 1984. Efecto del cultivo de meristemas sobre el rendimiento y vigor de dos variedades comerciales de yuca (Manihot esculenta Crantz). (Effect of meristem culture on the yield and vigor of two commercial cassava varieties). Tesis Ing.Agr. Palmira, Universidad Nacional de Colombia. 76p. Span., Sum. Span., Engl., 51 Refs., Illus.

Cassava. Apical meristems. Root productivity. Cultivars. Viroses. Harvest index. Dry matter. Cuttings. Plant anatomy. Leaves. Carbohydrate content. Starch content. Sugar content. HCN content. Temperature. Climatic requirements. Disease transmission. Colombia.

The effect of meristem culture on the yield and vigor of cassava var. Llanera and CMC-40 was studied. The var. were planted in the field either as conventional cuttings or as plantlets obtained through meristem culture techniques developed at CIAT, and were grown for 2 consecutive cycles that lasted 12 and 9 mo., resp. Data were taken on fresh root production, production of planting material, plant height, and height to 1st branching, among others. During the 1st yr var. Llanera (obtained through meristem culture) produced 52.9 percent more roots and 47.1 percent more planting material than the control plants obtained from cuttings; in CMC-40 the increases with respect to the control plants were 42.8 and 18.2 percent, resp. In the 2nd yr increases also occurred in both var., but to a lesser extent. In Llanera, meristem culture was found to affect plant morphology: the length:width ratio of leaf lobes was twice that of the control, and leaf thickness increased due solely to the formation of a thicker spongy mesophyll. The elimination or dilution of negative factors as a result of propagation by meristem culture could explain these morphological changes. The dramatic increase in the production of fresh roots and planting material in both var. as a consequence of the cleaning of the var. through meristem culture was clearly demostrated. (AS (extract))

046

26808 CUADRA M., A. ; RODRIGUEZ M., S. 1983. Estudio de diferentes métodos de plantación de la yuca (Manihot esculenta) y su relación con los rendimientos en el ecosistema de la Provincia de Guantánamo. (Study of different methods of planting cassava and their relationship with yield in the ecosystem of the Province of Guantanamo). Ciencia y Técnica en la Agricultura. Viandas Tropicales 6(1-2):51-60. Span., Sum. Span., Engl., 6 Refs. [Estación Experimental de Viandas Esteban Campos, Guantánamo, Ministerio de la Agricultura, Ciudad de La Habana, Cuba]

Cassava. Planting. Timing. Cuttings. Cultivars. Root productivity. Cuba.

Four different methods of planting cassava were studied at Esteban Campos Agricultural Expt. Station (Guantánamo, Cuba) on a deep, sodium to saline, sandy clay loam on calcareous alluvium. A Latin square design was used with 4 treatments and 4 replications. Planting methods were (1) inclined, forming a 45 degree angle with the ridge; (2) vertical, forming a 90 degree angle with the ridge; (3) horizontal on the ridge; (4) horizontal on the botton of the furrow. Planting material consisted of cuttings 20-25 cm

long (7-9 buds) from primary branches. The highest yield (60.42 t/ha) was obtained with planting method 3, although it was not significantly different from those obtained with the other methods. (AS)

047

26864 GARCIA, M. ; RODRIGUEZ M., S. 1983. Estudio comparativo de estacas de yuca (Manihot esculenta) procedentes de diferentes partes de la planta. (Comparative study on cassava cuttings from different parts of the plant). Ciencia y Técnica en la Agricultura. Viandas Tropicales 6(1-2):39-49. Span., Sum. Span., Engl., 13 Refs. [Centro de Mejoramiento de Semillas Agámicas, Santo Domingo, Villa Clara, Cuba]

Cassava. Cuttings. Selection. Stems. Root productivity. Cuba.

Results from a study carried out during 1981 and 1982 at Centro de Mejoramiento de Semillas Agámicas in Santo Domingo (Villa Clara, Cuba) are reported. The commercial cassava clone Señorita was used in a random block design with 4 replications and 8 treatments: cuttings from the 1st, 2nd, 3rd, 4th, 5th, and 6th main stem sections, from the base to the top, and cuttings from secondary and tertiary branches. All cuttings were 20 cm long. Cuttings from the 4th main stem section gave the highest yields. Cuttings from primary stems had a higher rooting percentage and a faster canopy development than those from secondary and tertiary branches (P equal to or less than 0.05). Those cuttings from primary stems showed a higher production potential, regardless of their site of origin, than those from secondary and tertiary branches (P equal to or less than 0.05). It is recommended to use cuttings from primary stems for commercial plantations. (AS)

048

26313 IZQUIERDO, D.A. ; DIAZ, R.O. 1986. Ensayos agronómicos. (Agronomic trials). In. Best, R.; Ospina P., B., comp. El desarrollo agro-industrial del cultivo de la yuca en la Costa Atlántica de Colombia. Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de secado natural de yuca período julio 1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. v.2,pp.64-70. Span., [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Field experiments. Timing. Planting. Cultivars. Storage. Cuttings. Intercropping. Root productivity. Harvesting. Germination. Cassava programs . Developmental research. Colombia.

The results of cassava agronomic trials conducted on the Colombian Atlantic Coast in 1984-85 are summarized. The results of trials on planting dates and age of harvest of var. M Ven 25 and Venezolana, established in 1983, indicate that the former adapts better to dry season conditions. They also confirm that a var. can be identified that could be planted during the 2nd semester, under water stress conditions, in order to satisfy the annual demand for cassava by the cassava drying plants. In another expt., 1.5-m-long cassava cuttings of the same 2 var., treated with insecticide/fungicide, were stored for 20, 85, and 149 days. Both var. showed high percentages of loss in germination (70 and 54 percent for M Ven 25 and Venezolana, resp.) and lowest yields when cuttings were previously stored for a 149-day period. Highest yields were achieved when cuttings were previously stored for a 85-day period, with and without fertilization: (11.8 and 12.3 t/ha for M Ven 25 and 12.8 and 11.7 t/ha for Venezolana, resp. No response to fertilizer application at planting was observed. Six additional trials were planted at different sites on the Atlantic Coast to study cassava/maize spatial arrangements and plant densities. Maize yields increased but those of cassava decreased; thus, changes in spatial arrangements/plant densities are not the way to increase productivity. The optimum system will depend on the relative prices of

maize and cassava, the quality standards, and the agroclimatic conditions of each microregion. (CIAT)

049

26719 LOCKARD, R.G. ; SAQUI, M.A.; WOUNUAH, D.D. 1985. Effects of time and frequency of leaf harvest on growth and yield of cassava (Manihot esculenta Crantz) in Liberia. Field Crops Research 12(2):175-180. Engl., Sum. Engl., 7 Refs. [Central Agricultural Research Inst., P.O. Box 3929, Monrovia, Liberia]

Cassava. Leaves. Harvesting. Timing. Root productivity. Stems. Growth. Harvest index. Liberia.

An expt. was carried out with cassava var. Caricass 2 to test the effects of leaf harvesting on plant growth and yield. The terminal 5 or 6 leaves of each shoot were collected starting at 4, 5, or 6 mo. after planting and at intervals of 1 or 2 mo. The time at which collection started had very little effect on the wt. of leaves collected or on the yield of tuberous roots. However, the frequency of collection had a marked effect on both. It is recommended that leaf collection should start 4 mo. after planting, and harvesting should be carried out at 2- mo. intervals in order to obtain the best yields of both leaves and tuberous roots. (AS)

050

26148 LYNAM, J.K. ; IZQUIERDO, D. 1984. Ensayo época de siembra y edad de cosecha: resultados parciales. (Trial on planting date and harvesting age: partial results). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia. Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.83-85. Span., [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Planting. Harvesting. Timing. Cultivars. Dry matter. Root productivity. Developmental research. Cassava programs. Colombia.

Partial results of trials on planting dates and harvesting age of cassava var. M Ven 25 and Venezolana (local), conducted at 4 sites in Betulia (Sucre, Colombia), are briefly given. A 1st trial with both var. was planted in April 1983 (normal planting date) and a 2nd trial in Aug. Each trial was harvested at 3 different ages: the 1st at 210, 280, and 340 days, and the 2nd at 300 days (the other 2 harvests are pending). In the 1st trial, the av. yield of M Ven 25 for all 3 harvesting ages was relatively constant (around 17 t/ha), while the av. yield of Venezolana tended to increase from 16 to 18-19 t/ha from the 1st to the last harvesting age. Although DM content decreased at the 3rd harvest, it remained at adequate levels in both var. In the 2nd trial, yields were considerably lower for both var. (11.1 and 6.8 t/ha for M Ven 25 and Venezolana, resp., at the 1st harvest). Venezolana does not adapt as well as M Ven 25 to the dry season stress. (CIAT)

051

26708 MARQUES, L.F. ; MONDARDO, E. 1984. Producao de manivas-semente de mandioca em Santa Catarina. (Production of cassava cuttings in Santa Catarina). Revista Brasileira de Sementes 6(1):105-109. Port., Sum. Port., Engl., 3 Refs. [Estacao Experimental de Itajaí, Empresa de Pesquisa Agropecuaria de Santa Catarina, Caixa Postal 277, 88.300, Itajaí-SC, Brasil]

Cassava. Cuttings. Production. Xanthomonas manihotis. Glomerella manihotis. Cultivars. Resistance. Brazil.

The value of cassava and problems associated with its production and disease incidence in Santa Catarina (Brazil) are outlined. Developments since 1977 in continuous production of cuttings, establishment of multiplication fields in Itajaí and Urussanga, and distribution of recommended cv. are briefly described. In the last 3 yr disease-free selected cassava cv. have been grown on an area of 400 ha in the state. (Field Crop Abstracts)

052

26771 NUGROHO, W.H. ; SUGITO, Y.; GURITNO, B.; UTOMO, W.H. 1985. Teknologi budidaya ubi kayu secara monokultur dan tumpangsari. (Technology of cassava cultivation in solo cropping and intercropping systems). In _____., Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengenbangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.181-200. Indon., Sum. Indon., Engl., 9 Refs.

Cassava. Cassava programs. Intercropping. Mukibat system. Developmental research. Manihot glaziovii. Manihot esculenta. Root productivity. Cultivars. Planting. Fertilizers. Indonesia.

Realizing the high yield potential of the Mukibat system, a research project was carried out from 1973 to 1980 at the Faculty of Agriculture, Brawijaya U. (Malang, East Java), under the sponsorship of IDRC-Canada. The project concentrated on cassava cultivation using the Mukibat system. Results showed that Mukibat cassava had a higher productivity than the traditional system, but production costs did not differ. To obtain a high yield, cassava requires 7 mo. or more. During the period of crop growth, the farmers require food for their families; therefore, any practice which could supply food while waiting for the cassava harvest would be very beneficial, not only in extending cassava cultivation but also in improving farmers' income. Recognizing these problems, Brawijaya U., in cooperation with the IDRC, initiated a new project in 1982 on root crop-based cropping systems. Results of research, especially on sole cropping of the Mukibat system and intercropping with cassava as the base crop, are discussed. (AS (extract))

053

26860 RAMOS, J.G.A. ; PERIM, S. 1986. Cultura da mandioca: recomendacoes técnicas para Goiás. (Cassava cultivation: technical recommendations for Goiás). Goiania-GO, Empresa Goiana de Pesquisa Agropecuária. Departamento de Difusao e Informacao. Circular Técnica no.10. 40p. Port., 35 Refs. [Empresa Goiana de Pesquisa Agropecuária, Estacao Experimental de Goiania, Caixa Postal 49, 74.130 Goiania-GO, Brasil]

Cassava. Planting. Climatic requirements. Nutritional requirements. Land preparation. Cultivars. Cuttings. Harvesting. Mechanization. Brazil.

Technical recommendations are given for cassava cultivation in Goias, Brazil, regarding cv. selection, planting material production, soil preparation, planting system, fertilization, cultural practices, phytosanitary problems (Xanthomonas campestris pv. manihotis, Cercospora sp., Vatiga illudens, Silba pendula, Erinnyis ello), harvesting, processing, and mechanization. (CIAT)

054

26807 RODRIGUEZ N., A. ; RODRIGUEZ M., S.; MORALES T., A. 1983. La època de plantación y la calidad del material de propagación y su influencia sobre los rendimientos en las viandas tropicales. (Planting season and planting material quality and their influence on tropical root crop yields). Ciencia y Técnica en la Agricultura. Viandas Tropicales 6(1-2):7-23. Span., Sum. Span., Engl., 7 Refs. [Centro de Mejoramiento de Semillas Agámicas, Santo

Domingo, Villa Clara, Ministerio de la Agricultura, Ciudad de La Habana, Cuba]

Cassava. Planting. Timing. Cuttings. Root productivity. Cuba.

Results from studies carried out at the Centro de Mejoramiento de Semillas Agámicas in Cuba on the effect of planting season on root crop (among them cassava) yields as well as on planting material quality requirements are reported. Under Cuban climatic and soil conditions, best yields (70.25 kg/plot) were obtained from primary branch stem cuttings, as compared with cassava stumps (59.25 kg/plot), secondary branch stem cuttings (51.00 kg/plot), and tertiary branch stem cuttings (39.75 kg/plot). (CIAT)

055

26839 RODRIGUEZ, S. ; BETANCOURT, F. 1982. Estudio sobre la densidad de plantación del clon de yuca (Manihot esculenta) 'Señorita'. (Study on the planting distance for cassava clone Señorita). Ciencia y Técnica en la Agricultura. Viandas Tropicales 5(2):15-26. Span., Sum. Span., Engl., 12 Refs. [Centro de Mejoramiento de Semillas Agámicas. Santo Domingo, Villa Clara, Cuba]

Cassava. Cultivars. Planting. Spacing. Root productivity. Stems. Roots. Timing. Shoots. Cuba.

Results are given of a comparative study on different distances between rows (1.20 and 1.40 m) and between plants (0.50, 0.70, 0.90, and 1.10 m), for cassava clone Señorita, carried out at the Subestación de Viandas Tropicales (Camaguey, Cuba). Results show no significant differences between treatments and subtreatments for percentage of emergence and canopy coverage of the soil. There were significant differences among subtreatments for yield, which varied from 2.2 (1.20 x 0.50 m) to 4.5 (1.20 x 1.10 m) kg/plant, at 10 mo. from planting; from 2.2 (1.20 x 0.50 m) to 4.4 (1.20 x 1.10 m) kg/plant, at 11 mo. from planting; and from 1.90 (1.20 x 0.50 m) to 4.01 (1.20 x 1.10 m) kg/plant at 12 mo. from planting. It was verified that those plants with 2 or 3 primary stems yielded significantly more than those with a single primary stem. (AS)

056

26862 VECCHIO, V. ; RAIMONDO, F.M.; SHIRWA, A.H.; ROSSITTO, M. 1984. Les mauvaises herbes du manioc en Somalie. (Weeds in cassava in Somalia). In Colloque International sur l'Ecologie, la Biologie et la Systemátique des Mauvaise Herbes, 7éme., Florence, Italy, 1984. Comptes rendu. Italy, Universita degli Studi di Firenze. pp.191-200. Fr., Sum. Fr., Engl., 4 Refs.

Cassava. Weeds. Weeding. Somalia.

As a result of weed surveys at 11 sites in the cassava growing areas of Somalia, 102 species belonging to 88 genera and 31 families were identified. The weed cover was about 45 percent with an av. of 41.45 species/site. The weed community closely resembles the Gisekio-Teprosetum Pumilae community found in pastures and dunes of the area. Crops are currently hand weeded 4 or 5 times during the rainy season. (AS)

057

26736 WATANANONTA, W. 1986. Productivity of early harvesting in cassava under different rainfall patterns. M.Sc. Thesis. Muñoz, Nueva Ecija, Philippines, Central Luzon State University. 82p. Engl., Sum. Engl., 57 Refs., Illus.

Cassava. Root productivity. Harvesting. Timing. Field experiments. Rainfall data. Dry matter. Cultivars.

The productivity of early harvesting in cassava and its interaction with planting time were analyzed, and the availability of specific genotypes for early harvest was evaluated in field expt. carried out on relatively infertile soil at Rayong Field Crop Research Center (Thailand). Eight clones of contrasting plant types were used with 4 different planting times and 2 harvesting dates. Highly satisfactory root DM and root fresh wt. yields (9 and 25 t/ha, resp.) were obtained with a high yielding clone 8 mo. after planting. Rayong 1, the leading local cv., also gave satisfactory yields (5-8 t DM/ha and 15-21 t root fresh wt./ha). Cassava yield generally increased from 8 to 12 mo. after planting and yield/day at both early and late harvest were similar. Successful early yields were obtained when cassava was planted (1) at the beginning of the rainy season and harvested at the beginning of the dry season, (2) at the end of the rainy season and harvested during the early rainy season, and (3) during the dry season and harvested during the later part of the rainy season. Planting pattern 1 can be practiced with min. risk without irrigation but after cassava is harvested, irrigation must be applied. When planting pattern 2 is used, irrigation is not necessary and a 2nd crop can also be planted without irrigation; however, the risk of germination failure and plant death is high during the dry season. Planting pattern 3 is less risky and there is no need to irrigate the 2nd crop. Root yield was affected more by rainfall distribution than by total rainfall accumulation. Root DM content was highest at the beginning of the dry season and lowest at the beginning of the rainy season. HI and root DM content were found to be highly heritable characters, whereas root yield, total plant wt., root no./plant, and individual root wt. were more influenced by the environment. High-yielding clones were characterized by high total plant wt., HI, and root no./plant. An alternative for successful early cv. is a combination of high vegetative vigor with reasonable HI. (AS (extract)) See also 002 003 027 030 031 048 075

D04 Postharvest Studies

058

26355 BALAGOPALAN, C. ; PADMAJA, G. 1985. Cassava spoilage and preservation. Trivandrum, India, Central Tuber Crops Research Institute. Technical Bulletin Series no.3. 17p. Engl., 11 Refs., Illus.

Cassava. Deterioration. Storage. Roots. Rhizopus oryzae. Cyanogenic glucosides. Cultivars. Analysis. Enzymes. HCN content. Dry matter. Detoxification processes. Biochemistry. India.

The results of research work on the biochemical and microbiological nature of cassava deterioration are given, and low cost technologies developed at the Central Tuber Crops Research Institute (Trivandrum, India) to prolong the shelf life of fresh cassava are discussed. Total phenols in fresh cassava were observed to markedly decrease during the 3rd day of storage, sharply increase after the 4th day when pathogen attack commenced, and then decrease again when rotting reached 74-80 percent. A similar trend was observed for acidity. Rhizopus oryzae and Bacillus sp. were isolated from deteriorating cassava roots. R. oryzae was found to efficiently detoxify cyanogenic glycosides and assimilate HCN; once detoxification is complete, the fungus can grow rapidly. Cellular and extracellular enzymes associated with cassava deterioration included cellulase, amylase, pectin methyl esterase, polygalacturonase, peroxidase, and polyphenol oxidase. The shelf life of fresh cassava roots could be extended for over 2 mo. by storing roots in pits with alternate layers of moist medium (sand, soil, or sawdust). (CIAT)

059

26772 BARRETT, D.M. 1985. Teknologi pasca panen ubi kayu di Indonesia. (Cassava postharvest technology in Indonesia). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa

Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.201-237. Engl., Sum. Indon., Engl., 14 Refs., Illus.

Cassava. Cassava programs. Post-harvest losses. Distribution. Marketing. Factories. Gaplek. Fresh products. Drying. Storage. Feeds and feeding. Leaves. Cassava chips. Cassava meal. Cassava flour. Stems. Processed products. Consumption. Indonesia.

Losses of cassava, an important staple food in Indonesia, have been estimated at 25 percent but may be higher depending on road conditions, harvesting and packaging methods used, age of cassava, and other factors. Sixty percent of the cassava produced in Indonesia is consumed while the remaining 40 percent is used for industrial purposes. Marketing channels depend on several factors, the most important being the farmer's proximity to starch and/or pellet factories. Farmers located near starch factories tend to transport their own fresh cassava or go through 1, or, at most, 2 traders on route to the factories. Farmers located far from the starch factories often choose to reduce the size and wt. of their tubers by cutting and sun-drying them (gaplek) prior to sale to a pelletizer. The quality of fresh cassava and gaplek received at the industry is often poor due to the lack of knowledge concerning improved postharvest practices, manpower, and monetary incentives for improved quality. Gaplek stored and consumed at the farmer's home is also of low quality. Cassava is still seen as an inferior crop and many of the postharvest difficulties incurred in Indonesia are related to this concept. To improve the image and physical quality of cassava in Indonesia, postharvest research efforts should be focused primarily on: classification of var. for future end-use, socioeconomic difficulties in cassava acceptance, marketing, utilization of cassava starch and gaplek flour in domestic foods; improvement of by-product utilization; use of gaplek in domestic feeds; economic feasibility of alcohol, SCP, and high fructose syrup; and improved methods of cassava and gaplek drying and storage. Potential for increased domestic consumption and industrial utilization exists, but products must be assessed from the socioeconomic viewpoint as well as regarding the technical aspects. (AS)

060

26844 LANCASTER, P.A. ; COURSEY, D.G. 1984. Traditional post-harvest technology of perishable tropical staples. Rome, Food and Agriculture Organization of the United Nations, FAO Agricultural Services Bulletin no.59. 89p. Engl., 232 Refs., Illus.

Cassava. Post-harvest technology. HCN. Cassava chips. Cassava flour. Cassareep. Cassava pastes. Atieke. Chickwangue. Foofoo. Gari. Fresh products. Dried roots. Drying. Solar drying. Labor. Root crops. Italy.

The literature concerning the traditional postharvest technology of cassava and other noncereal staple foods, which predominate in the humid, low-alt. tropics, is reviewed. Traditionally, the problem of cassava storage has been overcome by leaving the roots in the ground until needed and, once harvested, processing them immediately into a dry form with a longer shelf life; the end product is generally a flour, although the dried roots are often stored in some other form. Among the most important products from cassava roots are the coarse meals known as gari in West Africa and farinha in Brazil. On the other hand, cassava starch extraction is a technique used widely throughout cassava producing regions worldwide. Attention is also given to the specific role of women in postharvest technology. The daily preparation of foods such as cassava bread, which involves arduous tasks such as grating the raw roots by hand, may take up to 75 percent of a woman's working time, and during festivals, her whole time may be devoted to the preparation of special alcoholic beverages from cassava. (CIAT)

061

26373 PADMAJA, G. ; BALAGOPAL, C. 1985. Cyanide degradation by Rhizopus oryzae. Canadian Journal of Microbiology 31(8):663-669. Engl., Sum. Engl., Fr., 36 Refs., Illus.

Cassava. HCN. Detoxification processes. Rhizopus oryzae. Linamarin. Linamarase. Rhodanese. Thiocyanates. India.

Rhizopus oryzae, a mucoraceous fungus associated with the postharvest spoilage of cassava, was found to effectively metabolize cyanide. Degradation of cyanogenic glycosides of cassava by R. oryzae was studied by growing the organism in potato dextrose broth, with and without linamarin and potassium cyanide. The influence of adaptation of the organism to low and high cyanide concn. on both growth and the release of extracellular rhodanese into cyanide-containing media was studied. Nonadapted cultures of R. oryzae grow poorly when compared with the cyanide-adapted cultures. However, nonadapted R. oryzae cultures released large quantities of rhodanese when compared with the adapted ones. Potassium cyanide (1.0 millimolar) was found to be an efficient inducer of rhodanese whereas potassium cyanide (5.0 millimolar) repressed the release of rhodanese. A significant inductive effect was produced by thiosulphate and thiocyanate. Linamarin repressed the rhodanese activity of cultures during the growth phase. R. oryzae also elaborated extracellular linamarase during its growth in broth with and without linamarin. This study revealed the potential use of R. oryzae in detoxifying the cyanogenic glycosides in cassava feed and food preparations as well as in the effective disposal of cyanide in industrial wastes. (AS)

062

26871 PADMAJA, G. ; BALAGOPAL, C.; POTTY, V.P. 1982. Cellulolytic, amylolytic and pectinolytic enzyme activities of deteriorating cassava roots. Journal of Root Crops 8(1-2):35-40. Engl., Sum. Engl., 20 Refs., Illus.

Cassava. Roots. Deterioration. Enzymes. Storage. Timing. Cyanogenic glucosides. India.

The pattern of changes in polysaccharide-degrading enzymes during storage of cassava roots was investigated in fresh tubers and in tubers stored up to 8 days at 30 degrees Celsius. In most of the 5 var. studied there was an initial increase (followed by a decrease) in the activity of all the enzymes studied (cellulase, amylase, pectin esterase, polygalacturonase); max. degrading enzyme activities were detected during the 4th-6th days of storage. The fact that fresh tubers also possess the degrading enzyme activities leads to the possibility that tissue degradation during storage of cassava is due to the combined action of host as well as extracellular enzymes. (AS) See also 079 088 092 171

E00 PLANT PATHOLOGY

063

27602 SOUZA, S.M.C. DE 1985. Mandioca. (Cassava). Informe Agropecuario 11(123):60-65. Port., 17 Refs., Illus.

Cassava. Bacterioses. Symptomatology. Xanthomonas manihotis. Mycoses. Viroses. Nematodes. Pest control. Pest damage. Brazil.

The symptomatology, dissemination, conditions favoring pathogen survival and infection, and control measures are given for several cassava diseases: CBB, anthracnose, cassava ash, cercosporioses, superelongation, stem and root rots, viral diseases, mycoplasmosis, and nematode-caused diseases. (CIAT)

064

26733 THEBERGE, R.L., ed. 1985. Common African pests and diseases of cassava, yam, sweet potato and cocoyam. Ibadan, Nigeria, International Institute of Tropical Agriculture. 116p. Engl., Illus.

Cassava. Diseases and pathogens. Symptomatology. Pest control. Pest damage. Noxious animals. Insect biology. Injurious insects. Injurious mites. Root crops. Nigeria.

An illustrated guide to cassava, yam, sweet potato, and cocoyam pests and diseases in Africa is presented. Brief notes on distribution, hosts, symptoms, damage, physical description, biology, and control are included for most of them. Cassava diseases included are CAMD and those caused by Xanthomonas campestris pv. manihotis, X. campestris pv. cassavae, Colletotrichum gloeosporioides, Cercosporidium henningsii, Cercospora caribaea, C. vicosae, Sclerotium rolfsii, the complex Phytophthora spp. - Pythium spp. -Fusarium spp., the complex Armillariella mellea-Rosellinia necatrix-others, and Meloidogyne spp. Cassava pests included are Mononychellus spp., Oligonychus gossypii, Tetranychus spp., Phenacoccus manihoti, P. madeirensis, Ferrisia virgata, Aonidomytilus albus, and Zonocerus spp. (CIAT)

065

26752 THURSTON, H.D. 1984. Cassava. In _____. Tropical plant diseases. St. Paul, Minnesota, The American Phytopathological Society. pp.64-68. Engl., 12 Refs., Illus.

Cassava. Diseases and pathogens. Cassava African mosaic virus. Sphaceloma manihoticola. Xanthomonas campestris pv. manihotis. USA.

The shortcomings of past cassava research is discussed, highlighting the importance of the crop and recent research efforts by International Institute of Tropical Agriculture (Nigeria) and CIAT (Colombia) regarding major diseases, particularly CAMD and CBB (Xanthomonas campestris pv. manihotis). Other diseases that are being studied are those caused by Cercospora spp., Sphaceloma manihoticola, and Phoma sp. Emphasis is made on literature available on cassava diseases, especially at CIAT. (CIAT) See also 008

E02 Bacterioses

066

26710 ALCALA DE MARCANO, D. ; MARCANO A., J . 1982. Prueba de resistencia varietal al añublo bacterial de la yuca (Manihot esculenta) Crantz. (Varietal resistance trial to cassava bacterial blight). Agronomía Tropical 32(1-6):111-123. Span., Sum. Span., Engl., 16 Refs.

Cassava. Cultivars. Resistance. Xanthomonas campestris pv. manihotis. Venezuela.

In the zone of Manzanita (Lara, Venezuela), 15 sweet and 5 bitter cassava cv. were evaluated for resistance to CBB to select and propagate resistant materials with satisfactory yields. The degree of resistance was scored according to a 0-5 scale, where 0 indicated absence of symptoms (immune or resistant) and 5, exudate on the stems, defoliation, dieback, and/or plant death (highly susceptible). Evaluations in latticework sheds were carried out up to 45 days after inoculation, following the same criteria used for the field trial. Cv. Honorio, M Ven-2197, M Ven-48, M Ven-52, M Ven-122, and Llanera were the most resistant with av. root yields of 16,110, 25,980, 26,500, 35,775, 35,525, and 42,625 kg/ha, respectively. Cv. M Ven-20, M Ven-44, M Ven-96, and M Ven-46 were susceptible, while M Ven-32, M Ven-2191, and M Ven-110 were highly susceptible with yields greatly inferior to the national av. The other cv. were classified as tolerant with low root

production/ha. The results obtained in latticework sheds agreed with field trial results. (AS)

067

26716 ATHAYDE, J.T. 1981. Virulencia de Xanthomonas campestris pv. manihotis (Berthet & Bondar 1915) Dye 1978 e atividade biológica do seu polissacarídeo capsular. (Virulence of Xanthomonas campestris pv. manihotis and the biological activity of its capsular polysaccharide). Tese Mag.Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 42p. Port., Sum. Port., Engl., 70 Refs.

Cassava. Xanthomonas campestris pv. manihotis. Leaves. Petioles. Laboratory experiments. Isolation. Brazil.

The appearance of cultures of Xanthomonas campestris pv. manihotis, stored for more than 10 mo. in mineral oil, was studied on a medium containing 0.005 percent of 2,3,5 triphenyltetrazolium chloride (TTC) to make correlations with virulence. Colonies obtained on TTC medium had different sizes and white/red color variations. Type A colonies, the predominant type, were large with a reddish center and large colorless margins. The diameter of the center corresponded to half the diameter of the colony. Type B colonies were small, almost entirely reddish. Their diameter was usually 1/3 that of type A colonies. Margins were white, about 0.5 mm wide. Type C colonies were tiny and white. Type D colonies had diameters between those of type A and type C colonies. The red/white color proportion of this type varied from a tiny red point in the center of the colony to the color of type B colonies. Evaluation of pathogenicity showed that types A, C, and D were virulent; type B colonies showed little or no virulence. All the colonies were serologically proven to be of the same species. In the biological activity study of the crude preparation of a capsular exo-polysaccharide (EPS) from a virulent isolate of X. campestris pv. manihotis, obtained from a medium containing 0.005 percent TTC and cultivated in a specific growth medium, a bacterial suspension was obtained in a buffered NaCl 0.85 percent solution. After centrifugation, the supernatant was precipitated by ethanol 95 percent. The precipitate was resuspended in sterilized distilled water, and submitted to dialysis for 48 h in 400 vol. of distilled water. The biological activity of EPS was tested in plants of cassava cv. Chagas, by immersing the bases of the stems in tubes containing 5 ml EPS in distilled water. Its concn. varied from 8 to 1000 micrograms/ml galactose equivalent. The time necessary for wilt symptoms to appear decreased proportionally with increasing EPS concn. After 30 min of immersion, 100 percent wilting occurred with 1000 micrograms/ml galactose equivalent. Recovery of turgescence was observed when 0.5 cm of the wilted sprout was removed and the remaining part was immediately immersed in distilled water. (AS)

068

26707 BOHER, B. ; DANIEL, J.F.; NDONGO, P. 1985. Recherche des sites d'expression de la tolérance vis-a-vis de Xanthomonas campestris pathovar manihotis (Arthaud-Berthet) Starr chez certains cultivars de manioc (Manihot esculenta Crantz). (Identification of sites of expression of tolerance to Xanthomonas campestris pathovar manihotis in some cassava cultivars). Agronomie 5(8):677-683. Fr., Sum. Fr., Engl., 15 Refs., Illus.

Cassava. Xanthomonas campestris pv. manihotis. Resistance. Inoculation. Cultivars. Leaves. Stems. Congo.

The behavior of CBB-tolerant and CBB-susceptible cassava cv. after artificial inoculation was studied, indicating that disease tolerance is related to the existence of particular sites on the plant. These sites are anatomical and physiological barriers, which act during infection (by raising the inoculum threshold and accelerating the healing of wounds on the lamina) or during colonization of plant tissues (by delaying the

migration of the parasite through the xylem). The multiplication rate of the bacteria in the intercellular spaces of the mesophyll was similar in tolerant and susceptible cv. (AS)

069

26751 DANIEL, J.F. ; BOHER, B. 1985. Etude des modes de survie de l'agent causal de la bactériose vasculaire du manioc, Xanthomonas campestris pathovar manihotis. (Study on the survival mechanisms of the causal agent of cassava bacterial blight, Xanthomonas campestris pathovar manihotis). Agronomie 5(4):339-346. Fr., Sum. Fr., Engl., 16 Refs., Illus.

Cassava. Xanthomonas campestris pv. manihotis. Seeds. Injurious insects. Congo.

Analysis of the mechanisms ensuring persistence of Xanthomonas campestris pv. manihotis explains the fact that this disease is endemic in numerous regions and causes sudden outbreaks in healthy zones. Two mechanisms are essential: (1) the capacity of the pathogen to have an epiphytic phase and (2) its conservation in host tissues. Debris, soil, and weeds are not of major importance for the survival of the pathogen, but the role of insects should not be neglected. (AS)

070

26367 MARCANO, M. ; TRUJILLO, G.E.; LUCIANI, J. 1984. Las condiciones climáticas del Estado Aragua y su relación con la incidencia y severidad del añublo bacteriano de la yuca (Manihot esculenta Crantz). (Climatic conditions of the state of Aragua and their relationship with the incidence and severity of cassava bacterial blight). Revista de la Facultad de Agronomía (Venezuela) 13(1-4):151-166. Span., Sum. Span., Engl., 17 Refs., Illus.

Cassava. Disease transmission. Xanthomonas campestris pv. manihotis. Climatic requirements. Rainfall data. Cultivars. Temperature. Symptomatology. Venezuela.

Observations made under field (Maracay, Venezuela) and shade house conditions indicated that the amount and distribution of rainfall are the climatic factors that most affected the incidence and severity of CBB in the state of Aragua, Venezuela. During the mo. of June, Aug., and Sept. (rainy season), the monthly av. rainfall for the last 10 yr was equal to or over 100 mm. The typical symptoms of CBB (angular spots, bacterial exudate, wilting, and dieback) were observed in field and shade house expt. during that season. The mo. of Dec., Jan., Feb, and March (dry season) usually receive less than 15 mm rainfall/mo., and no CBB symptoms were observed in this season. The mo. of April, May, Oct., and Nov. are intermediate in rainfall, and CBB may or not occur. The evaluations of CBB resistance of genetic material should be carried out during the rainy season. (AS)

071

26366 MARCANO, M. ; TRUJILLO, G. 1984. Papel de las malezas en relación a la perpetuación del añublo bacteriano de la yuca. (Role of weeds in relation to the perpetuation of cassava bacterial blight). Revista de la Facultad de Agronomía (Venezuela) 13(1-4):167-181. Span., Sum. Span., Engl., 23 Refs.

Cassava. Weeds. Xanthomonas campestris pv. manihotis. Disease transmission. Symptomatology. Climatic requirements. Rainfall data. Water requirements (plant). Venezuela.

The role of the most common weeds of the cassava crop in the central zone of Venezuela in relation to CBB (Xanthomonas campestris pv. manihotis) was studied under shade and field (Maracay) conditions. Isolations of X.

campestris pv. manihotis resistant to the antibiotic rifocine were used, maintained on PDA, supplemented with 50 mg rifocine/liter and 30 mg cycloheximide/liter. Acalypha alopecuroides, Ageratum conysoides, Amaranthus sp., Blechum pyramidatum, Commelina diffusa, Desmodium tortuosum, Emilia sonchifolia, Euphorbia heterophylla, Melochia pyramidata, Panicum fasciculatum, Paspalum paniculatum, Physalis angulata, Portulaca oleracea, Ruellia tuberosa, Sida sp., and Sorghum halepense were studied. The pathogen under adequate field conditions (rainy season) can be isolated in great quantities either on the external surface or in internal leaf tissue from all the samples tested, 15 and 45 days after inoculation. At 90 days it was recovered from samples of the following weeds: A. alopecuroides, Amaranthus sp., M. pyramidata, P. paniculatum, and R. tuberosa. The results obtained from the samples of weeds under shade conditions, during the rainy season, were similar to the ones under field conditions. Bacteria were isolated from all the weeds mentioned before and B. pyramidatum. Under adverse ambient conditions (summer season), where the precipitation is scarce, the RH is low, and the days are sunny, the pathogen could not be isolated from the weeds sampled longer than 72 h after spraying and in none of the cases could the pathogen be isolated from the internal leaf tissue 24 h after spraying with the pathogen. (AS)

072

26372 ORTIZ, G., C.F. ; RUIZ B., P.; IBARRA L., F.A. 1985. Efecto de dos productos químicos en la desinfección de la estaca de yuca Manihot esculenta (Crantz), del tizón bacteriano causado por Xanthomonas manihotis (Arthoud, Berthet) Star. (Effect of two chemical products on the disinfection of cassava cuttings infected with bacterial blight caused by Xanthomonas manihotis). Revista Mexicana de Fitopatología 3(2):9-14. Span., Sum. Span., Engl., 20 Refs., Illus. [Colegio Superior de Agricultura Tropical, Depto. de Fitopatología y Fitotecnia, 86500 Cárdenas, Tabasco, México]

Cassava. Cuttings. Xanthomonas manihotis. Disease control. Germination. Mexico.

The effectivity of Agrimycin-100 (streptomycin sulfate 15 percent + oxytetracycline 1.5 percent) and of Vanodine (monilphenol-polyoxy-ethylen-propylene-iodine 2.5 percent) to disinfect cassava cuttings infected with bacterial blight (Xanthomonas manihotis) was studied. In antibiosis tests in vitro, Agrimycin-100 showed bactericidal action, whereas in effectivity tests in vivo with diseased material it was ineffective. High rates of Agrimycin-100 reduced the germination of treated cuttings. Vanodine had no action on X. manihotis neither in vitro nor in vivo. (AS)

073

26846 ROSAS A., C.C. 1986. Relación de Manihot esculenta a especies de rizobacterias fluorescentes. (Relationship between Manihot esculenta and fluorescent rhizobacteria strains). Tesis Biólogo (Botánica). Cali, Colombia, Universidad del Valle. 75p. Span., 102 Refs., Illus.

Cassava. Pseudomonas. Inoculation. Cultivars. Roots. Plant growth substances. Bacterioses. Mycoses. Plant physiology. Colombia.

The effects of 47 selected fluorescent pseudomonad isolates on cassava var. CM 523-7, MVEN 77, CMC 40, CMC 92, and HCOL 2053 were determined, and the relationship between plant growth responses and bacterial root colonization as well as the effect of Pseudomonas fluorescens on Diplodia manihotis and Azobacter sp. were studied. Four fluorescent pseudomonad groups were identified according to their capacity to inhibit fungi and bacteria. Only 4 percent of 119 strains evaluated showed antagonism toward the pathogens. Four groups were also identified based on their capacity to antagonize pathogens in vitro and or to induce host growth responses. Some strains showed clone specificity and this proved to be an important

mechanism for growth promotion. Inoculation increased root and/or foliage wt. and inoculation with P. fluorescens strain 238 and Azobacter increased root wt. significantly. Results show that good control of D. manihotis can be achieved by inoculating cuttings with P. fluorescens. (CIAT)

074

26397 SANTOS, R.M.D.B. DOS ; DIANESE, J.C. 1985. Comparative membrane characterization of Xanthomonas campestris pv. cassavae and X. campestris pv. manihotis. Phytopathology 75(5):581-587. Engl., Sum. Engl., 59 Refs., Illus. [Depto. de Biologia Vegetal, Univ. de Brasilia, 70.910, Brasilia-DF, Brasil]

Cassava. Xanthomonas campestris pv. manihotis. Xanthomonas campestris pv. cassavae. Laboratory experiments. Brazil.

Cell envelopes of the cassava pathogens Xanthomonas campestris pv. manihotis (Xcm) ENA-2648 and X. campestris pv. cassavae (Xcc) CIAT-1165 were obtained by sonication in the presence of lysozyme and fractionated into 2 bands by sucrose density gradient centrifugation. In both pathovars, the light band (density = 1.142 g/cubic centimeter) showed high nicotinamide adenine dinucleotide oxidase and succinate dehydrogenase activities, low contents of 2-keto-3-deoxyoctonate, and larger no. of peptides in SDS-polyacrylamide gel electrophoresis (PAGE)than are usually found in inner membrane. The heavy band (density = 1.255 g/cubic centimeter) showed a high level of 2-keto-3-deoxyoctonate, low enzyme activity, and characteristic outer membrane pattern in SDS-PAGE. Changes in incubation temp. did not affect the SDS-PAGE patterns of the cell envelope of Xcm ENA-2648; however, a major 15-kdalton protein present in Xcc CIAT-1165 changed into a minor component when incubation was at 27.5 and 35.0 degrees Celsius. Four strains of Xcm and 5 of Xcc revealed major peptide bands at 114.0, 100.0, 41.0, 28.5, 26.0, and 22.0 kdaltons in SDS-PAGE. Membranes treated with 2 percent SDS at different temp. showed heat-modifiable proteins in cell envelopes of both pathovars. A 41-kdalton, heat-modifiable peptide, shared in common by both pathovars, is apparently the OmpA protein of X. campestris. Major differences in peptide profiles between strains of Xcm and Xcc in SDS-PAGE were detected, which suggested that the Colombian strains of Xcc are phylogenetically more related to Xcm than to the African strains of Xcc. (AS)

075

26818 THAVEECHAI, N. ; SCHAAD, N.W. 1986. Serological and electrophoretic analysis of a membrane protein extract of Xanthomonas campestris pv. campestris from Thailand. Phytopathology 76(2):139-147. Engl., Sum. Engl., 27 Refs., Illus. [Dept. of Plant Pathology, Kasetsart Univ., Bangkok, Thailand]

Cassava. Laboratory experiments. Xanthomonas campestris pv. manihotis. Analysis. Proteins. Thailand.

LiCl-extracted membrane proteins of 35 strains of Xanthomonas campestris pv. campestris from Thailand were characterized by serology and SDS-polyacrylamide gel electrophoresis. Antisera were made to membrane proteins of 7 strains. When membrane proteins of homologous strains were tested by Ouchterlony double diffusion, a single major line of precipitin always resulted. With some strains, up to 3 minor lines of precipitin also resulted; 2-4 other minor lines of precipitin were present in immunoelectrophoresis. By testing with the major common line of precipitin, the strains of X. campestris pv. campestris were grouped in 3 serovars--I, I-A, and II. When tested by immunofluorescent microscopy, all strains of X. campestris pv. campestris were positive with immunoglobulin G to membrane proteins of the 7 strains. None of 20 other xanthomonads or 11 other species reacted with the 7 antisera by Ouchterlony double diffusion, except 4 strains of X. campestris pv. vesicatoria and 1 strain of X.

campestris pv. incanae (which cross-reacted in Ouchterlony double diffusion). All 24 bacteria were immunofluorescent negative, except 4 strains X. campestris pv., vesicatoria and 1 strain each of X. campestris pv. incanae and X. campestris pv. manihotis. SDS-polyacrylamide gel electrophoresis profiles of membrane proteins showed that X. campestris pv. campestris possesses very few major membrane peptides and that these peptides are unique within taxonomic groups. This suggests that the membrane proteins of X. campestris pv. campestris are distinct and therefore useful for identification and taxonomy. (AS)

076

26387 WHITLOCK, V.H. ; HILL, R.R.; COWLEY, H.M. 1986. New bacterial pathogen causing blight of cassava in southern Africa. Plant Disease 70(2):167-169. Engl., Sum. Engl., 11 Refs., Illus. [Dept. of Microbiology, Univ. of the Witwatersrand, 1 Jan Smuts Ave., Johannesburg, 2001, South Africa]

Cassava. Laboratory experiments. Isolation. Erwinia herbicola. Enterobacter agglomerans. Symptomatology. Leaves. Inoculation. Disease transmission. South Africa.

Cultures from lesions similar to bacterial blight from cassava plantings in Natal and Swaziland yielded a yellow-pigmented organism showing characteristics of the genus Erwinia. Pathogenicity was established by induction of similar lesions in exptl. plants by leaf inoculation. Field and lab. symptoms were similar. Symptoms progressed from angular chlorotic lesions to tip and margin necrosis followed by wilting, and finally, abscission. Plant death occurred 5 wk. after inoculation in the lab. Taxonomic profiles of isolates suggest similarity to the Erwinia herbicola-Enterobacter agglomerans complex. (AS) See also 051 113

E03 Mycoses

077

26874 SULOCHANA, K.K. ; WILSON, K.I.; NAIR, M.C. 1982. Some new host records for Cylindrocladium quinqueseptatum from India. Agricultural Research Journal of Kerala 20(2):106-108. Engl., Sum. Mal., 2 Refs. [College of Agriculture, Vellayani, 695 522, Trivandrum, Kerala, India]

Cassava. Cylindrocladium quinqueseptatum. Symptomatology. India.

Sixteen different plant species were artificially inoculated with Cylindrocladium quinqueseptatum, causal agent of leaf blight disease in clover (widely prevalent in Kerala, India). Cassava was among the 14 plant species found to be new hosts of the pathogen. Leaf blight symptoms appeared the 3rd day after inoculation; leaves soon turned ashy grey and profuse white mycelial growth was observed on the affected leaf surface as well as general plant chlorosis. (CIAT)

078

26830 TERI, J.M. ; KESWANI, C.L. 1985. New records of plant diseases and pathogens in Tanzania. East African Agricultural and Forestry Journal 46(1-4):97-99. Engl., 4 Refs. [Dept. of Crop Science, Univ. of Dar es Salaam, P.O. Box 643, Morogoro, Tanzania]

Cassava. Periconia manihoticola. Mycoses. Tanzania.

The occurrence of some plant parasitic fungi and an alga in Tanzania is reported. New records obtained since 1980 include Periconia manihoticola, which causes leaf spot on cassava and on Manihot glaziovii. (CIAT)

079

26894 WEERASINGHE, B. ; NAQVI, S.H.Z. 1985. Some comparative physiological

studies on selected isolates of Botryodiplodia theobromae Pat. causing storage rot of yams, cassava and sweet potato in Nigeria. International Biodeterioration 21(3):225-228. Engl., Sum. Engl., 11 Refs., Illus. [Dept. of Botany, Open Univ., Nawala, Sri Lanka]

Cassava. Botryodiplodia theobromae. Storage. Postharvest losses. Deterioration. Nigeria.

Host specificity of 3 isolates of B. theobromae from yam, cassava, and sweet potato is reported. Physiological differences between the yam and sweet potato isolates were established in their growth on selected sugars, pattern of extracellular enzyme production, and pathogenicity under different temp. and RH regimes. (AS)

E04 Viroses

080

26743 HOWARTH, A.J. ; CATON, J.; BOSSERT, M.; GOODMAN, R.M. 1985. Nucleotide sequence of bean golden mosaic virus and a model for gene regulation in geminiviruses. Proceedings of the National Academy of Sciences of the United States of America 82(11):3572-3576. Engl., Sum. Engl., 54 Refs., Illus. [Dept. of Plant Pathology, Univ. of Illinois, Urbana, IL 61801, USA]

Cassava. Cassava latent virus. Bean golden mosaic virus. Geminivirus. USA.

The sequence of the genome of BGMV, which comprises 2 circular single-stranded DNA molecules (2646 and 2587 nucleotides long) of mostly unique sequence, was defined. Comparison of the sequences of BGMV and of CLV, which share serological relationship but are very different in host range and geographical origin, shows that each virus has a unique 200-nucleotide sequence (common region) on each 2.6-kilobase molecule of its genome. The common regions of the 2 viruses have no sequence homology except for a short inverted repeat near the 3' end. Six open reading frames were identified that possess considerable sequence homology between the 2 viruses and, in BGMV, may encode proteins of 15.6, 19.6, 27.7, 29.7, 33.1, and 40.2 kilodaltons. Conserved open reading frames are found in both the viral strand and the complementary strand, are approx. the same size, and are in the same orientation with respect to the common region in both viruses. Temporal regulation in geminiviruses may depend on the polarity of transcription and the common region may represent a replication origin and contain elements that serve to modulate gene expression. (AS)

081

26834 MOHANA R., J.K. 1985. Sequence homology among the coat proteins of gemini viruses. Biochemical and Biophysical Research Communications 130(2):892-896. Engl., Sum. Engl., 25 Refs., Illus. [Dept. of Biological Sciences, Purdue Univ., West Lafayette, IN 47907, USA]

Cassava. Cassava latent virus. Analysis. USA.

African CLV, tomato golden mosaic virus, and maize streak virus were shown to have reasonable to good amino acid sequence homology. It is suggested that the maize streak virus genome is ancestral and the bipartite genomes of the other viruses evolved from it. (AS)

082

26369 MULLINEAUX, P.M. ; DONSON, J.; STANLEY, J.; BOULTON, M.I.; MORRIS-KRSINICH, B.A.M.; MARKHAM, P.G.; DAVIES, J.W. 1985. Computer analysis identifies sequence homologies between potential gene products of maize streak virus and those of cassava latent virus and tomato golden mosaic virus. Plant Molecular Biology 5(2):125-131. Engl., Sum. Engl., 17 Refs., Illus. [John Innes Inst., Colney Lane, Norwich NR4 7UH, England]

Cassava. Cassava latent virus. Amino acids. Virus inhibition. United Kingdom.

The amino acid sequences of the putative polypeptides of maize streak virus (MSV) have been systematically compared with those of CLV and tomato golden mosaic virus (TGMV) using the program DIAGON (an interactive graphics program). Conserved sequences have been detected between peptides encoded by the complementary (-) sense of MSV and those of CLV and TGMV, viz; the 40 200 Mr polypeptide of CLV-1 and the 40 285 Mr polypeptide of TGMV-A show extensive homologies with the 17 768 Mr and 31 388 Mr polypeptides of MSV. Distant and variable homologies have been detected the putative coat protein of MSV when compared with those of CLV and TGMV. No other relationships between the potential gene products of MSV and those of CLV and TGMV have been detected. The extensive homologies detected between the complementary sense encoded peptides suggest that they are derived from functional genes, and that the directly conserved sequences may contain amino acids essential to the function of these proteins. The less extensive homologies among the putative coat proteins are considered in relation to their possible structures and functions. (AS)

083

26753 THURSTON, H.D. 1984. African cassava mosaic disease. In _____. Tropical plant diseases. St. Paul, Minnesota, The American Phytopathological Society. pp.69-76. Engl., 40 Refs., Illus.

Cassava. Cassava African mosaic virus. Bemisia. Disease control. Disease transmission. USA.

The etiology, import ..ce, symptoms, hosts, vectors and transmission, and control of CAMD are reviewed. Cassava yield losses of up to 86 percent have been reported, with Bemisia tabaci being the most important vector. While disease resistance is considered the most important control measure, the most rational control would also include the use of disease-free planting material, roguing of infected plants, and isolating healthy crops from those diseased. (CIAT)

E06 Nematodes

084

26718 McSORLEY, R. ; PARRADO, J.L. 1985. Relative performance of two cassava cultivars in a field infested with Meloidogyne incognita. Proceedings. Soil and Crop Science Society of Florida 44:180-183. Engl., Sum. Engl., 12 Refs. [Inst. of Food & Agricultural Sciences, Univ. of Florida, Gainesville, FL 32611, USA]

Cassava. Nematodes. Meloidogyne incognita. Cultivars. Stems. Planting. Cuttings. Root productivity. USA.

The performance of 2 cassava cv., Mantiqueira and Señorita, planted in a heavily infested site (mean initial population of 61 Meloidogyne incognita juveniles/100 cubic centimeters of soil) near Naranja (Florida, USA), was compared. Two planting positions, vertical vs. horizontal placement of the vegetative cutting, were examined in a factorial expt. Root galling and soil populations of M. incognita juveniles were significantly higher on Señorita than on Mantiqueira, and marketable yield of Mantiqueira was over 5 times as great. Mantiqueira yielded better when seed pieces were planted in a vertical position compared with a horizontal position. Cassava yield was inversely correlated with root galling, but nematode populations in soil early in the season showed no significant correlations with yield, since all initial population levels (range 10-165/100 cubic centimeters) quickly increased to high populations producing heavy galling on the susceptible Señorita. (AS)

085

26149 JIMENEZ, N. ; LOBATON, V.; MESTRA, A. 1984. El control del chinchilín (Orthoporus sp.) en yuca. (Control of Orthoporus sp. in cassava). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer Informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.86-88. Span.,

Cassava. Orthoporus. Pest control. Cultivars. Insecticides. Cassava programs. Colombia.

The habits and damage caused to cassava by the myriapod Orthoporus sp., found on the Colombian Atlantic Coast, are briefly described and a control measure is given. A bait consisting of fresh chopped cassava (2 kg) + brown sugar loaf (2 units) + carbaryl or trichlorfon (2 tablespoonfuls) + water (3 liters) was used. This poisoned bait was effective against the pest; it is recommended to complement this bait with the manual destruction of individual myriapods late in the afternoon. (CIAT)

086

26723 MARTIN P., C.A. 1985. Biología y comportamiento de Polistes erythrocephalus Ltr. Hymenoptera:Vespidae, predador del gusano cachón de la yuca Erinnyis ello L. Lepidoptera:Sphingidae. (Biology and behavior of Polistes erythrocephalus (Hymenoptera:Vespidae), predator of the cassava hornworm Erinnyis ello (Lepidoptera:Sphingidae)). Tesis Ing.Agr. Palmira, Universidad Nacional de Colombia. 135p. Span., Sum. Span., Engl., 73 Refs., Illus.

Cassava. Predators and parasites. Injurious insects. Erinnyis ello. Bacillus thuringiensis. Polistes erythrocephalus. Insect control. Colombia.

In Palmira and other cities of Valle del Cauca and Quindic (Colombia), the biology, behavior, and predation potential of wasps of the genus Polistes, natural enemies of Erinnyis ello, were studied as well as management of wasp colonies in commercial cassava crops and in soybean, sorghum, maize, cotton, and sugarcane crops. The life cycle of Polistes lasted approx. 110 days, ranging between 91-131 days. In screenhouses (2.5 x 2.5 x 2.5 m), it was determined that its predation capacity depends on the no. of larvae. Max. consumption/day was 1.3 E. ello larvae (II and III instar) and the min. 0.08 (av. 0.5). The relationship between the size of the nest and its population was studied. Males were not found in nests with less than 50 cells; in nests with more than 50 cells, the no. of males increased with nest size until they almost equalled the females in no. Polistes populations seem to be regulated by the climatic conditions, food availability, insecticide applications, and by other insects that are associated with their nests. Of the 412 Polistes nests examined, 17 percent were parasitized by Oxysarcodexia sp., the latter being the most frequent parasite of Polistes larvae and pupae. This insect is, in turn, parasitized by several hymenoptera, among which are Pachyneuron sp. and Brachymeria conica. Xenos sp. is the most frequent natural enemy of Polistes in its adult stage. The methodology for the recollection, transportation, and establishment of colonies in order to locate nests within and near commercial cassava crops was determined. Recommendations for further studies are given. (AS (extract)-CIAT)

087

26382 URIAS L., M.A. ; CARRILLO S., J.L. 1983. Plagas principales de la yuca, Manihot esculenta Crantz, en la sabana de Huimanguillo, Tabasco. (Main pests of cassava in the savanna area of Huimanguillo, Tabasco).

Agricultura Técnica en México 9(1):65-83. Span., Sum. Span., 15 Refs., Illus.

Cassava. Injurious insects. Erinnyis ello. Erinnyis alope. Frankliniella cephalica. Corynothrips stenopterus. Timing. Temperature. Cultivars. Root productivity. Mexico.

A survey of the arthropod pests of cassava at 2 sites in the state of Tabasco, Mexico, was carried out in 1980 on exptl. plots in which the crop was sown in Jan. The pests that were most abundant and injurious were Erinnyis ello and the thrips Frankliniella cephalica; the thrips Corynothrips stenopterus were also abundant but caused less damage. At 1 site, 75-78 percent of the plants were infested by F. cephalica in July-Aug. and the terminal shoots and adjacent leaves showed slight deformities and yellow spotting. At the other site, 100 percent of the plants were infested in Aug., and the leaf deformities were more severe. Although populations of E. ello were not large, they caused severe damage and chemical control measures were applied. However, yields were not significantly increased by the treatments. Other pests that occurred sporadically included Iatrophobia brasiliensis, Aleurothrixus sp., Lagocheirus sp., Mononychellus tanajoa, Tetranychus cinnabarinus, Ferrisia virgata, Pseudococcus longispinus, and Silba pendula (Neosilba pendula). Notes are given on some of the natural enemies observed. (Review of Applied Entomology) See also 063 064

F01 Injurious Insects and their Control

088

26755 ARCOZZI, L. ; CONTESSI, A. 1984. Insetti infestanti le derrate in importazione al porto di Ravenna (periodo 1976-1981). (Insects infesting imported foodstuffs at the port of Ravenna (1976-81)). In Simposio sulla Difesa Antiparassitaria nelle Industrie Alimentari e la Protezione degli Alimenti, 3o., Piacenza, Italy, 1982. Italy, Camera di Commercio Industria Artigianato e Agricoltura. pp.231-242. Ital., Sum. Ital., Engl., 2 Refs., Illus. [Osservatorio Malattie Piante, Regione Emilia-Romagna, Ufficio Staccato di Ravenna, Italy)]

Cassava. Cassava products. Storage. Deterioration. Injurious insects. Italy.

Samples of natural and manufactured foodstuffs of plant origin imported from various countries into Ravenna, Italy, were inspected for the presence of insects in 1976-81, both on arrival at the port and after storage for 6 mo. The results are summarized in tables. Cassava was among the most heavily infested imports. Many of the infestations were latent, becoming apparent only at the 2nd inspection. (CIAT)

089

26746 BIASSANGAMA, A. 1984. Etude du parasitisme des Cochenilles Pseudococcidae par les Hyménopteres Encyrtidae; application a la lutte biologique contre la cochenille du manioc Phenacoccus manihoti en République Populaire du Congo. (Study on parasitism of Phenacoccus citri and Phenacoccus manihoti by the hymenopterans Encyrtidae; their use in the biological control of Phenacoccus manihoti in Congo). These Doctorat. Rennes, France, Universite de Rennes I. 199p. Fr., Sum. Fr., 187 Refs., Illus.

Cassava. Phenacoccus manihoti. Predators and parasites. Apoanagyrus lopezi. Insect control. Timing. Maps. Congo.

Parasitism of Phenacoccus citri by Leptomastix dactylopii and of P. manihoti by Apoanagyrus lopezi was studied in detail under lab. conditions. The taxonomy, biology, reproduction, and longevity of A. lopezi and L.

dactylopii are described, and the ecology of parasitism by these 2 microhymenopterans is analyzed as to their specificity, exploitation of host, host immunological reactions, and host-parasite interactions. Also the possibility of using A. lopezi in the fight against P. manihoti is discussed, and the results of several studies carried out in Congo on the population dynamics of P. manihoti on a cassava crop are given. During the dry season (5-6 mo.) P. manihoti populations reach max. values (500-1000 insects during the 1st yr and 1500-2000 insects during the 2nd) causing enormous damages. During the rainy season (6-7 mo.) the population is controlled by the mechanical action of rains. In preliminary observations with 400 A. lopezi individuals, its acclimatization and efficacy were confirmed, with a 3.25 percent rate of parasitism. However, this parasite is, in turn, already hyperparasitized (7.8 percent) by Prochiloneurus bolivari, an autochthonous Encyrtidae, which indicates the progressive establishment of an indigenous biocenosis around P. manihoti. In spite of the occurrence of the hyperparasite, A. lopezi is seen as a useful tool for the biological control of P. manihoti. (CIAT)

090

26396 CHAPMAN, R.F. ; PAGE, W.W.; McCAFFERY, A.R. 1986. Bionomics of the variegated grasshopper (Zonocerus variegatus) in west and central Africa. Annual Review of Entomology 31:479-505. Engl., 127 Refs. [Dept. of Entomology, Univ. of California, Berkeley, CA 94720, USA]

Cassava. Zonocerus variegatus. Insect biology. Resistance. HCN content. Insecticides. Africa.

The bionomics of the polyphagous Zonocerus variegatus in west and central Africa, which attacks cassava, is reviewed regarding life history and phenology, behavior, relations with plants, population dynamics, determinants of its geographical and seasonal distribution, changing importance as a pest, and damage and control. All stages of Z. variegatus, except the 1st instar, are known to be infected by the fungus Entomophaga grylli, which is the principal cause of mortality among nymphs. Only in the dry season, when the infectivity of the fungus is low, is it possible for dense Z. variegatus aggregations to survive. Cassava tolerance to 1st larval instars of Z. variegatus appears to be related to the HCN content; instars IV to VI, however, seem to be tolerant to the HCN content, particularly in group feeding. The increasing area planted to cassava in the region has undoubtedly contributed to increase the abundance of the pest; the spread of the weed Chromolaena adorata, native to tropical America, is also suggested to be a causal factor. Chemical control is the most effective means available, but Z. variegatus egg destruction can be practiced by subsistence farmers. (CIAT)

091

26163 EMPRESA CATARINENSE DE PESQUISA AGROPECUARIA. 1986. Baculovirus controla mandarová da mandioca.. (Baculovirus controls the cassava hornworm). Florianápolis-SC, Brasil, Secretaría da Agricultura e do Abastecimento. Documentos no.60. 2p. Port., Illus.

Cassava. Biological control. Predators and parasites. Erinnyis ello. Baculovirus erinnyis. Insect control. Brazil.

The use of Baculovirus erinnyis to control Erinnyis ello in cassava fields is briefly described. Baculovirus should be applied when 5-7 E. ello larvae are found per plant. It is obtained from recently dead infected larvae by maceration and dissolution in 200 liters water/ha; 1 ha requires 8 large larvae (7-9 cm in length), 22 medium-sized larvae (4-6 cm), 30 small larvae (less than 4 cm), 18 g of larvae, or 20 ml of liquid obtained from macerated infected larvae. Baculovirus should be sprayed early in the morning or late in the afternoon. The advantages of using Baculovirus to control E. ello include: reduced production costs, pesticide use, and

environmental pollution; 90 percent efficiency in pest control; easy application; seleotivity; and high dispersion capacity. From 1 application, other sources of the Baculovirus can be obtained for future use. (CIAT)

092

26881 HODGES, R.J. 1986. The biology and control of Prostephanus truncatus (Horn) (Coleoptera: Bostrichidae). A destructive storage pest with an increasing range. Journal of Stored Products Research 22(1):1-14. Engl., Sum. Engl., 87 Refs. [Tropical Development & Research Inst., Storage Dept., London Road, Slough, Berkshire SL3 7HL, England]

Cassava. Prostephanus truncatus. Insect biology. Storage. Dried roots. Africa.

A comprehensive review is presented on the biology and control of Prostephanus truncatus, a major pest of farm-stored maize and dried cassava. Originally indigenous to Mexico and Central America, P. truncatus has recently been introduced and become established in parts of East and West Africa where it has caused severe damage to farm-stored maize. It can cause far greater losses than those associated with traditional storage pests. Biological data show that P. truncatus has the potential to spread still further in Africa and to other tropical and subtropical regions. Every effort should be made to prevent this happening. (AS)

093

26740 HODGES, R.J. ; MEIK, J.; DENTON, H. 1985. Infestation of dried cassava (Manihot esculenta Crantz) by Prostephanus truncatus (Horn) (Coleoptera:Bostrichidae). Journal of Stored Products Research 21(2):73-77. Engl., Sum. Engl., 12 Refs. [Tropical Development & Research Inst., Storage Dept., London Road, Slough, Berkshire SL3 7HL, England]

Cassava. Prostephanus truncatus. Dried roots. Storage. Fermentation. United Kingdom.

A field study was undertaken in Tanzania to determine the extent of losses that Prostephanus truncatus could cause in fermented and unfermented dried cassava roots stored over a period of about 4 mo. In fermented roots, the mean wt. loss (plus or minus standard deviation) rose to 73.6 plus or minus 25.9 percent over this period compared with 52.3 plus or minus 12.0 percent in unfermented roots. At each time interval that roots were examined, the wt. loss in fermented roots was significantly higher. Subsequent lab. studies, undertaken to identify some of the factors responsible for this difference between the 2 types of cassava, comprised (1) a determination of the length of larval and pupal development at 27 degrees Celsius and 50 or 70 percent RH, (2) adult preference for the 2 types, and (3) their susceptibility to adult boring. P. truncatus developed at a similar rate in both fermented and unfermented roots, but the adults appeared to prefer the fermented cassava possibly because it was easier to bore into. This was certainly 1 factor making fermented roots more susceptible to damage by adults. It is concluded that although P. truncatus caused lower wt. loss in the unfermented compared with the fermented roots, both were so heavily damaged that it is not worth recommending the storage of one rather than the other. The role of cassava as an intermediate host for P. truncatus is discussed and consideration is given to the need to control the beetle in cassava in order to reduce cross-infestation to maize. (AS)

094

26841 NENON, J.-P. 1985. La cochenille du manioc. (The cassava mealybug). Phytoma no.367:54-55. Fr., Sum. Fr., Illus.

Cassava. Phenacoccus manihoti. Predators and parasites. Apoanagyrus lopezi. Congo.

A brief report is given on the cassava mealybug (Phenacoccus manihoti), which since 1973 has caused substantial losses to this crop in Central and East African countries. In Congo, periodic outbreaks of the insect populations occur during the dry season. Major aspects of the damage caused, insect biology, and biological control measures are summarized. The mealybug parasite Apoanagyrus lopezi, introduced into the Congo in 1952, is well established now but presents 2 serious drawbacks: it can reproduce itself by arrhenotoky and is, in turn, hyperparasitized by another Encyrtidae, the indigenous specie Prochiloneurus bolivari. (CIAT)

095

26850 SENGUPTA, C.K. ; SENGUPTA, T. 1981. Cerambycidae (Coleoptera) of Arunachal Pradesh. Records of the Zoological Survey of India 78(1-4):133-154. Engl., Sum. Engl., 6 Refs., Illus.

Cassava. Sthenias grisator. India.

A list is given of 16 cerambycid species that were recorded for the 1st time from Arunachal Pradesh, India, with notes on diagnostic characters and distribution in India. Food-plant records are cited for some of the species. Among those of economic importance is Sthenias grisator on cassava, mulberry, grapevine, and forest trees. (Review of Applied Entomology (extract))

096

25514 SIMWAMBANA, M.S.C. 1983. A preliminary survey of the cassava mealybug infestation in Luapula Province. Mansa, Zambia, Luapula Regional Research Station. 8p. Engl., Illus.

Cassava. Insect control. Phenacoccus manihoti. Maps. Zambia.

Results of a preliminary survey of Phenacoccus manihoti infestation in cassava in Luapula Province, Zambia, are presented. The pest was reported to be more severe in eroded soils and on slopes in Kimpese, as well as in sandy areas with low soil moisture. P. manihoti infestations were recorded in the Mwense and Nchelenge districts. The pest appears to have been introduced into the country by nature (wind) and man along the Luapula river and then spread to the north throughout the Luapula valley. It is thought that the absence of the pest in the Kawambwa district could be due to high rainfall (av. 1255 mm/yr) compared with the other districts in the province. Some recommended cultural practices are mentioned. A map indicating infested areas is also included. (CIAT)

097

26873 SMITH, N. 1985. A plague on manioc. Geographical Magazine 57(10):539-540. Engl., Illus.

Cassava. Phenacoccus manihoti. Predators and parasites. Apoanagyrus lopezi. Diomus. Injurious mites. Africa.

Two threats to cassava, Phenacoccus manihoti and Mononychellus tanajoa, in Africa, where this crop is a staple food for 200 million people, are reported. Mealybugs may reduce tuber yields by up to 80 percent and cause reduction of the leaf cover, a valuable source of protein. The green spider mite has led to an av. 30 percent yield drop in cassava fields across the continent. Trial releases of the introduced predators Apoanagyrus lopezi and Diomus sp. have been encouraging and a multinational program of biological control has been launched. The development of genetic resistance has been successful: a no. of clones with pubescent leaves, a physiological defense mechanism, have been identified. The International Institute of Tropical Agriculture has developed a cassava var. that resists mealybugs and spider mites, produces good quality flour, and is high yielding. Soon

it will be released to farmers. The crucial role of gene banks for the improvement of cropland yield and stability is stressed. (CIAT)

098

26895 VAN DRIESCHE, R.G. ; BELLOTTI, A.; HERRERA, C.J.; CASTILLO, J.A. 1986. Encapsulation rates of two encyrtid parasitoids by two Phenacoccus spp. of cassava mealybugs in Colombia. Entomologia Experimentalis et Applicata 42:79-82. Engl., Sum. Engl., Fr., 9 Refs. [Dept. of Entomology, Univ. of Massachusetts, Amherst, MA 01003, USA]

Cassava. Phenacoccus herreni. Phenacoccus gossypii. Predators and parasites. Colombia.

Between 3-15 percent of all parasitized cassava mealybugs of the species Phenacoccus herreni successfully defeated the parasitoid Epidinocarsis diversicornis through encapsulation. Adult mealybugs were less successful at encapsulating all parasitoids than were nymphs in the 2nd stage. Encapsulation rates were higher at 25 than at 30 degrees Celsius in both nymphs and adults. No encapsulation of E. diversicornis was observed in Phenacoccus gossypii. No significant encapsulation of another encyrtid, Acerophagus coccois, was observed in either species of mealybug. (AS)
See also 171

F03 Injurious Mites and their Control

099

25799 DORESTE S., E. 1984. Avances en la búsqueda de variedades de yuca (Manihot esculenta Crantz) resistentes a los ataques de ácaros tetraníquidos. (Advances in the search for cassava varieties resistant to attacks by Tetranychid mites). Revista de la Facultad de Agronomía (Venezuela) 13(1-4):85-90. Span., Sum. Span., Engl., 5 Refs.

Cassava. Resistance. Cultivars. Pest damage. Mononychellus. Field experiments. Venezuela.

Field trials to evaluate resistance of cassava plants to mite attacks were carried out in Maracay (Aragua, Venezuela) from 1978 to 1981, as part of a joint project of CIAT, Centro Nacional de Investigaciones Agropecuarias, and U. Central de Venezuela. Natural resistance in cassava to mite attacks was found. Var. Mex-71 and Col-414 were ranked as highly resistant and var. Col-974, Col-310, Col-1524, Col-323, Col-974-A, Col-1180, Mex-26, Mex-29, Bra-33, Ven-26, Ven-214, and Ven-133 as slightly resistant. (AS)

100

26826 EZULIKE, T.O. ; ODEBIYI, J.A. 1985. Life history of Amblyseius fustis (Pritchard and Baker), an indigenous predator of the cassava red mite, Oligonychus gossypii (Zacher) in south western Nigeria. Insect Science and its Application 6(2):193-197. Engl., Sum. Engl., 7 Refs., Illus. [National Root Crops Research Inst., Umudike, Umuahia, Imo State, Nigeria]

Cassava. Predators and parasites. Amblyseius fustis. Oligonychus gossypii. Laboratory experiments. Mite biology. Nigeria.

The life history of Amblyseius fustis was studied in the lab. at fluctuating temp. (24.4-28.0 degrees Celsius) and RH (55.5-75.6 percent). The developmental stages consist of egg, larva, protonymph, deutonymph, and adult. The life cycle, from egg to adult, of both male and female was about 8.0 days, while longevity was about 19.2 days. Mated female laid an av. of 18.8 eggs. There was no significant difference in the longevity and fecundity of predators fed on different life stages of the host. The proportion of male to female in the progeny of mated females was 1:4. A. fustis has a shorter developmental period and lives longer than its prey Oligonychus gossypii, but the latter is more fecund (26.9 eggs/female) and

has a higher proportion of females in its progeny (1:4.8). The shorter developmental period and the longer life span of the predator are likely to offset the higher fecundity of the prey. (AS)

101

26393 VEIGA, A.F.DE S.L. 1985. Aspectos bioecológicos e alternativas de controle do ácaro verde da mandioca Mononychellus tanajoa (Bondar, 1938) (Acarina, Tetranychidae) no Estado de Pernambuco. (Bioecological aspects and alternative control methods of the green cassava mite, Mononychellus tanajoa (Acarina, Tetranychidae) in the state of Pernambuco)). Tese Doutor Sc. Piracicaba-SP, Brasil, Escola Superior de Agricultura Luiz de Queiroz, da Universidade de Sao Paulo. 152p. Port., Sum. Port., Engl., 100 Refs., Illus.

Cassava. Mononychellus tanajoa. Mite control. Mite biology. Biological control. Planting. Resistance. Cultivars. Ecology. Insecticides. Brazil.

The biological aspects related to climatic factors and alternative control measures for the green cassava mite (Mononychellus tanajoa) were studied under field conditions in the agroecosystem of Araripina, the hinterlands of Araripe, Goiana, and Recife, and the Zona da Mata area of the state of Pernambuco, Brazil. The green mite species in the different geographical regions of Pernambuco were identified. The damage caused by M. tanajoa on cassava plants is described in detail; a damage scale of 0-5 was established to measure the variation and intensity of the damage. The only alternate host plant of M. tanajoa found was Manihot piauhyensis. The population fluctuation of the green mite and the critical period for cassava were determined in Araripina conditions: mite incidence begins in May and continues until Nov., with a peak between Aug., Sept., and Oct. The critical period for cassava ranged between mo. 6-11 of the plant vegetative cycle. Population fluctuation was negatively correlated with the rainfall and the RH. It was observed that 75.0 percent of eggs and 86.4 percent of the active mite forms were concentrated between July-Oct. In Araripina conditions, the mortality and residual effects of miticides against M. tanajoa until 30 days after application were evaluated as well as the control efficiency until 150 days after initial application, with 30-day intervals between each application. Chlordimeform showed the highest efficiency: 97.0 percent control after 15 days, 80.2 percent after 30 days, and 62.2 percent until 150 days after initial application. Dicofol and chlorobenzilate were less effective. Vamidothion gave an efficiency of 73.6 and 55.8 percent until 7 and 15 days after initial application, resp. In Araripina the influence of cassava planting and harvest dates on green mite incidence was evaluated. Planting in Jan. and Feb. and harvest at 18 mo. were the most effective. Planting in March, April, and May gave yield losses of fresh tuber roots of about 14.0, 32.0, and 43.7 percent, resp. The harvest at 12 mo. gave a yield loss coefficient of 51.4 percent. Studies on the effect of the planting system on green mite incidence showed that planting on ridges gave the lowest damage scores and population densities, and the greatest mean plant height. Planting on ridges was statisticaly different from hill and high hill planting. In Recife conditions, cassava cv. Pau do Xexéu and Mandioca 1 were highly resistant to the attack of M. tanajoa during 2 consecutive years, showing the least damage and the lowest population density. (AS (extract))

102

25289 YASEEN, M. 1980. Preliminary investigations on the biology and ecology of the green cassava mite Mononychellus tanajoa (Bondar) in Trinidad. In Annual Meeting of the Caribbean Food Crops Society, 13th., St. Augustine, West Indies, 1975. Proceedings. St. Augustine. pp.166-178. Engl., 4 Refs., Illus.

Cassava. Mononychellus tanajoa. Mite control. Mite biology. Acaricides. Predators and parasites. Trinidad and Tobago.

The results of preliminary studies on the distribution, effect of plant age, biology, dispersal, population, natural enemies, and chemical control of Mononychellus tanajoa found in cassava in Trinidad are presented. Mite infestations of varying densities were found at most of the sites surveyed. The infestation density was always higher on the upper part of the plant (leaves 6-10). In June (28-31 degrees Celsius), the total egg to adult developmental period lasted 9-10 days and adults lived up to 12 days, while in Dec.-Jan. (25-28 degrees Celsius), the total developmental period lasted 12-13 days and adults lived up to 16 days. The dispersal studies indicated that the mite extended gradually through the exptl. plots in the direction of the wind. Heavy rains were found to rapidly reduce mite populations but other important factors affecting this parameter were cassava var., plant age and physiological condition, temp., and natural enemies. The dominant and most widespread mite predator was Oligota minuta; other natural enemies were Typhlodromalus limonicus, T. rapax, an unidentified thrip, an unidentified Cecidomyiidae, 2 Coccinellidae, and the predaceous mite Euseius hibisci. The acaricide chlordimeform (0.5 g/liter) applied at 3 to 4-wk.-intervals reduced the populations of M. tanajoa and its natural enemies; mite populations, however, built up rapidly whereas those of its natural enemies did not. (CIAT)

G00 GENETICS AND PLANT BREEDING

G01 Breeding, Germplasm, Varieties and Clones, Selection

103

26704 BAJAJ, Y.P.S. 1985. Cryopreservation of germplasm of potato (Solanum tuberosum L.) and cassava (Manihot esculenta Crantz): viability of excised meristems cryopreserved up to four years. Indian Journal of Experimental Biology 23(5):285-287. Engl., Sum. Engl., 6 Refs., Illus. [Tissue Culture Laboratory, Punjab Agricultural Univ., Ludhiana, India]

Cassava. Cryopreservation. Germplasm. Apical meristems. Growth. Timing. Plant development. India.

Excised meristems of potato and cassava freeze-preserved for periods ranging from 3 mo. to 4 yr did not show any significant difference in the percentage viability, and the regenerated plants were capable of undergoing tuberization. Cryopreservation can now be employed as an effective tool for the long-term conservation of germplasm. (AS)

104

26866 BUENO, A. 1985. Cultivares de mandioca selecionadas no Reconcavo Baiano. (Cassava cultivars selected from the Reconcavo Region of Bahia). Cruz das Almas-BA, Empresa Brasileira de Pesquisa Agropecuaria. Centro Nacional de Pesquisa de Mandioca e Fruticultura. 8p. Port., 3 Refs., Illus. [Empresa Brasileira de Pesquisa Agropecuaria, Centro Nacional de Pesquisa de Mandioca e Fruticultura, Caixa Postal 007, 44.380 Cruz das Almas-BA, Brasil]

Cassava. Cultivars. Root productivity. Cuttings. Tissue culture. Timing. Fertilizers. Starch productivity. Rainfall data. Brazil.

An agronomic evaluation of selected cassava cv. from a total of 160 entries evaluated in Cruz das Almas (Bahia, Brazil) during 1980-85 is presented. Botanical aspects, availability of planting material, and planting of cuttings are briefly discussed. Fertilized and unfertilized mean root yields and starch contents of 9 selected cv. and of controls and site rainfall data are given in table form. (CIAT)

105

26757 EMPRESA CATARINENSE DE PESQUISA AGROPECUARIA. 1984. Nova cultivar de mandioca recomendada para Santa Catarina. (A new cassava cultivar

recommended for Santa Catarina). Florianópolis. Documentos no.42. 2p. Port., Illus.

Cassava. Cultivars. Identification. Agronomic characters. Brazil.

This brochure promotes the new cassava cv. EMPASC 251-Machado, released for cultivation in the Vale do Itajai, Litoral Norte, and Florianópolis regions (Santa Catarina, Brazil). It includes a brief botanical description of the cv., which is resistant to CBB and has a root yield potential of 16 t/ha in the 1st cycle and 28 t/ha in the 2nd cycle, and starch yield potentials of 33 and 35 percent in the 1st and 2nd cycles, resp. (CIAT)

106

26312 HERSHEY, C.H. ; IZQUIERDO, D.; DIAZ, R.O. 1986. Pruebas regionales. (Regional trials). In Best, R.; Ospina P., B., comp. El desarrollo agro-industrial del cultivo de la yuca en la Costa Atlántica de Colombia. Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de secado natural de yuca período julio-1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. v.2,pp.59-63. Span., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cultivars. Root productivity. Field experiments. Dry matter. Cassava programs. Developmental research. Colombia.

The results of the 1984-85 regional cassava trials conducted at 5 sites in Sucre, Córdoba, Atlántico, and Magdalena (Colombia) are presented. The av. DM yield was 5.5. t/ha, ranging between 3.6-7.7 t/ha; this compares favorably with the regional av.: 3 t/ha. Clone M Ven 25 gave the highest yield (6.6 t DM/ha across all sites), followed by the regional var. Venezolana (6.2 t/ha) and M Col 1505 (5.9 t/ha). In general, all clones reached acceptable yields. Results of 2 yr indicated that the abovementioned clones, as well as CM 681-2, showed stable performance. (CIAT)

107

26147 HERSHEY, C.H. ; IZQUIERDO, D.; DIAZ, R.O. 1984. Pruebas regionales. (Regional trials). In Best, R., ed. Plant piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Span., [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cultivars. Root productivity. Dry matter. HCN. Drying. Timing. Fresh products. Cassava chips. Solar drying. Developmental research. Cassava programs. Colombia.

The results of 6 regional cassava trials in 1983-84, conducted in Córdoba, Sucre, Atlántico, and Magdalena (Colombia), are presented. The av. DM yield was 4.7 t/ha, which compares favorably with the national av. (3.5 t/ha). The best clones were M Ven 25, M Col 1684, CM 681-2, M Col 22, the control Venezolana, and M Col 1505 with av. yields of 6.3, 5.4, 5.3, 5.2, 5.0, and 4.9 t/ha, resp. M Ven 25, M Col 1684, and CM 5C7-37 produced chips with over 100 ppm cyanide; thus, their use should be restricted to starch extraction. Four other clones had cyanide levels slightly over 100 ppm but the drying time and load on drying floors could be extended to reduce this level. The use of clones with reduced DM content would markedly decrease the profitability of drying plants, unless the purchase price reflects their poorer quality. (CIAT)

108

25735 JENNINGS, D.L. ; HERSHEY, C.H. 1984. Cassava breeding: a decade of progress from international programmes.. In Russell, G.E., ed. Progress in plant breeding. London, Butterworths. v.1,pp.89-116. Engl., 81 Refs.,

Illus. [Scottish Crop Research Inst., Invergowrie, Dundee DD2 5DA, Scotland]

Cassava. Cassava programs. Plant breeding. Germplasm. Flowering. Hybridizing. Seed. Plant physiological processes. Root productivity. Starch content. Bacterioses. Viroses. Mite control. Disease control. Resistance. Cyanogenic glucosides.

The advances in cassava breeding over a decade up to 1985 by CIAT and the International Institute of Tropical Agriculture (Nigeria) are reviewed. Topics dealt with include germplasm resources in the genus Manihot; cytogenetics of Manihot spp.; germplasm collection and conservation; flowering behavior, hybridization technique, and seed management; breeding strategies in Africa, Latin America, and Asia; and the physiological basis of high yield with special reference to the significance of plant habit and criteria/procedures for selecting high-yielding genotypes. The different uses of cassava require breeding to be focussed on (1) root quality (HCN, starch content and quality, postharvest deterioration, and protein content); (2) tolerance to stress (soil acidity, low P, drought, and low temp.), and (3) resistance to diseases and pests with special reference to CAMD, Xanthomonas campestris pv. manihotis, fungal diseases (Colletotrichum spp. and Elsinoe brasiliensis, among others), mites (Mononychellus tanajoa y M. mcgregori, Tetranychus urticae, and Oligonychus peruvianus), mealybugs (Phenacoccus spp.), and thrips. Germplasm distribution and multiplication aspects are discussed. Data indicate that av. cassava yields have increased in the impact areas of both programs. (CIAT)

109

26399 KAWANO, K. 1982. Potential for cassava breeding in Asia. Cali, Colombia, Centro Internacional de Agricultura Tropical. 26p. Engl., Illus. [Field Crops Research Inst., Dept. of Agriculture, Bangkhen, Bangkok, Thailand]

Cassava. Cassava programs. Statistical data. Plant breeding. Root productivity. Cultivars. Marketing. Developmental research. Asia.

Feasible overall goals for cassava breeding in Asia are proposed on the basis of current national cassava breeding programs, achievements, and cassava demand in the following Asian countries: Thailand, Philippines, China, Malaysia, Indonesia, India, and Vietnam. CIAT germplasm that has been selected in Asian countries for outstanding traits is mentioned, among which are CM 305-13, CM 407-7, M Col 1684 hybrids, M Col 1468, and M Bra 12. If the current level of productivity is not significantly increased, the demand for cassava in Asia will not increase; on the other hand, demand will be unrestricted if a major improvement in productivity can be made and cassava can compete with maize, sorghum, and sugarcane. Three levels of research selection goals can be set: in the 1st, research is justified based on the importance of cassava but breeding objectives and goals are not defined, in the 2nd, research goals specify yield, DM content, and resistance to major diseases and pests as primary breeding objectives (30-50 percent yield increase in exptl. stations and 20-30 percent increase in production fields); and in the 3rd, research goals consider high yield increases to allow cassava to compete favorably with other crops as an energy source (100 percent yield increase, or 50 t/ha, in exptl. stations and 50 percent yield increase, or 25 t/ha, in production fields). (CIAT)

110

26843 KURIKA, L. 1985. Food crop germplasm collection at Keravat, Papua New Guinea. Newsletter. International Board for Plant Genetics Resources 9(1):8-9. Engl., [Lowlands Agricultural Experiment Station, Keravat, Papua New Guinea]

Cassava. Germplasm. Papua New Guinea.

Brief data are presented on the germplasm collection in Keravat (Papua New Guinea). The collection maintains 20 cassava accessions, most of which were collected locally in the East New Britain province. It also contains some var. from Puerto Rico. Characterization and evaluation work has been carried out. Sufficient plant materials of a no. of promising var. are available to farmers. (CIAT)

111

26392 NASSAR, N.M.A. 1984. Natural hybridization of Manihot reptans and M. alutacea in the state of Goias, Brazil and its bearing on cassava plant breeding. Indian Journal of Genetics and Plant Breeding 44(1):147-152. Engl., Sum. Engl., 12 Refs., Illus. [Depto. de Agronomía, Univ. de Brasilia, 70.919 Brasilia, Brasil]

Cassava. Hybridizing. Manihot reptans. Manihot alutacea. Plant anatomy. Leaves. Brazil.

Natural hybridization between Manihot reptans and M. alutacea in the state of Goias, Brazil, is described. The hybridization takes place in disturbed habitats where parental species occur sympatrically. Evidence of progressive introgression with M. esculenta in direction of M. reptans is observed. Morphological characters of M. reptans and M. alutacea and the hybrid are compared. (AS)

112

25786 ROCA, W.M. 1985. El cultivo de tejidos para la conservación de recursos genéticos in vitro. (Tissue culture for the conservation of genetic resources in vitro). Roma, Consejo Internacional de Recursos Fitogenéticos. Lecturas sobre Recursos Fitogenéticos no.3. 42p. Span., 14 Refs., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cryopreservation. Tissue culture. Apical meristems. Clones. Storage. Colombia.

The tissue culture methods available for the conservation of germplasm in vitro are described, with emphasis on meristem culture and special reference to cassava. Aspects dealt with regarding meristem culture techniques include sources of vegetative material, meristem isolation, culture media, plantlet development and micropropagation, culture ambient conditions, and transplanting to pots and field. Three methods of in vitro conservation are described: (1) continuous growth at normal rates, (2) limited growth at min. rates, and (3) total suppression of growth and metabolism; a cryogenic technique for conservation is described. It was concluded that meristem culture is the most adequate method available for the conservation of germplasm in vitro. To limit the growth of germplasm maintained in vitro, temp. is reduced, growth inhibitors, osmotic compounds, and activated C are included, and available nutrients are reduced; these methods have been extensively used in cassava. Total suppression of cell growth and metabolism has been successful through slow chilling of meristem, tip, bud, and embryo tissues. Based on successful results of potato and cassava conservation using cryogenic methods, long- and short-term preservation of gene banks in vitro can be achieved using liquid N and limited growth methods, resp. Germplasm can be effectively exchanged in vitro using the latter methods. (CIAT)

113

26711 SCHIOCCHET, M.A. ; TERNES, M.; MIURA, L. 1985. Avaliacao de cultivares de mandioca no Oeste Catarinense. (Evaluation of cassava cultivars in western Santa Catarina). Florianópolis-SC, Brasil, Empresa de Pesquisa Agropecuaria de Santa Catarina. Pesquisa em Andamento no.36. 4p. Port., 1 Ref. [Empresa de Pesquisa Agropecuaria de Santa Catarina, Centro de Pesquisa para Pequenas Propriedades, Caixa Postal 151, Chapecó-SC, Brasil]

Cassava. Cultivars. Root productivity. Bacterioses. Brazil.

In 1983-84, 10 cassava cv. were evaluated for root and top yields and resistance to CBB in Nova Erechim in western Santa Catarina (Brazil). Preliminary results indicate significant variability between cv. in terms of the parameters evaluated. Cv. Branquinha (29.5 t roots and 3.0 t tops/ha), Blumenau (27.1 t roots and 2.5 t tops/ha), and Mico (25.9 t roots and 5.6 t tops/ha) were outstanding and were classified as moderately resistant, susceptible, and moderately resistant to CBB, resp. Mantiqueira-IAC-24-2 was intermediate in root yield (20.8 t/ha), but higher in top yield (6.3 t/ha) and was the only cv. considered resistant to CBB. Maroon-E-15 and Orizon S,2-573, both moderately resistant to CBB, were the highest top yielders with 7.4 and 8.5 t/ha, resp. (CIAT) See also 066 177

H00 NUTRITION

H01 Cassava Foods and Nutritive Value

114

26717 CHILAKA, F.C. ; ANOSIKE, E.O.; OBIDOA, O. 1985. Effect of high and prolonged gari diets on some microsomal enzymes activities of rat liver. Qualitas Plantarum Plant Foods for Human Nutrition 35(2):159-164. Engl., Sum. Engl., 20 Refs. [Dept. of Biochemistry, Univ. of Nigeria, Nsukka, Nigeria]

Cassava. Gari. Enzymes. Diets. HCN. HCN absorption. Cyanogen. Animal physiology. Laboratory animals. Biochemistry. Nigeria.

Male Wister Albino rats (90-130 g) were fed control and (56 percent wt./wt.) gari-containing diets for 9 wk. and sacrificed at intervals of 1, 3, 6, and 9 wk. Liver microsomal fractions were assayed for glucose-6-phosphatase, NADP (reduced)-cytochrome c (P-450) reductase, NADP (reduced)-dichlorophenolindophenol reductase, cytochrome P-450 peroxidase, and aniline hydroxylase activities. Whereas changes were observed in the activity rates of all enzymes, significant changes were observed in the NADP (reduced)-cytochrome c reductase activity (43 percent inhibited, P less than 0.001) and glucose-6-phosphatase (19 percent inhibited, P less than 0.05) at 9 wk. The results are discussed in terms of the hepatotoxicity of gari. (AS)

115

26832 EKUNDAYO, C.A. 1984. Microbial spoilage of packaged gari in storage. Microbios Letters 26(103-104):145-150. Engl., Sum. Engl., 9 Refs. [Dept. of Botany, Univ. of Benin, Benin City, Nigeria]

Cassava. Gari. Storage. Deterioration Timing. Biochemistry. Industrial microbiology. Nigeria.

The spoilage of packaged gari in storage for 10 wk. was studied. The microbial flora of freshly roasted gari consisted initially of Pseudomonas spp., Bacillus spp., Penicillium spp., Aspergillus spp., Pichia membranaefaciens, and Saccharomyces chevalieri. After storage for 10 wk. at 15-20 degrees Celsius the microorganisms present consisted of all the species occurring in fresh gari in much greater populations, and in addition, Candida krusei and Geotrichum candidum. The gari became sooty due to the presence of masses of fungal spores, and a yeast-like odor developed, rendering it unacceptable for human consumption. (AS)

116

26370 NAVARRETE, D.A. ; GUTIERREZ, O.M.; BRESSANI, R. 1984. Digestibilidad, valor proteínico y necesidades de proteína de dietas a base de plátano/frijol y de yuca/frijol en jóvenes adultos. (Digestibility, protein value, and protein requirements of plantain-bean and cassava-bean diets in

young men). Archivos Latinoamericanos de Nutrición 34(4):654-665. Span., Sum. Span., Engl., 17 Refs. [Inst. de Nutrición de Centro América y Panamá, Guatemala, Guatemala]

Cassava. Human health. N. Digestibility. Protein content. Beans. Banana-plantains. Guatemala.

The short-term N balance method with multiple intakes was used with groups of 10 men on av. 24.8 yr old given a diet based on cassava or plantain without or with beans so that protein intake was 0, 0.2, 0.4, and 0.6 g/kg daily. Even with intakes of N of 105.7 and 117.4 mg/kg daily, the men did not reach positive balance. Protein digestibility was 55.7 percent for the cassava-bean diet and 50.4 percent for the plantain-bean diet. Mean N intake required to reach N equilibrium for the cassava-bean diet was 114.3 mg/kg daily, varying from 81.3 to 172.4 mg/kg, and for the plantain-bean diet 111.9 mg/kg daily, varying from 83.6 to 219.3 mg/kg. In 4 of 5 men who took part in both studies, the N intake required to reach N equilibrium was greater with the plantain-bean than with the cassava-bean diet. (AS (extract))

117

26806 OBIDOA, O. ; UZOKA, G.U. 1985. Inhibition of hepatic microsomal NADPH-cytochrome C (P-450) reductase activity in gari-fed rats. Qualitas Plantarum Plant Foods for Human Nutrition 35(1):63-72. Engl., Sum. Engl., 21 Refs., Illus. [Dept. of Biochemistry, Univ. of Nigeria, Nsukka, Nigeria]

Cassava. Gari. Laboratory animals. Cytochrome. Animal physiology. Biochemistry. Timing. Animal health. Nutritive value. Nigeria.

Nicotinamide adenine dinucleotide phosphate, reduced (NADPH)- cytochrome C (P-450) reductase activities were measured in liver microsomes prepared from male albino rats (110-115 g) fed control and (35 percent wt./wt.) gari-based diets for 8 wk. and sacrified at intervals of 1, 3, 5, and 8 wk. After an initial increase (2-fold) in NADPH oxidation in the 1st wk., the gari diet consistently produced marked decreases in the Km and Vmax values for NADPH oxidation and cytochrome C reduction. Inhibition of cytochrome C reduction was consistently greater than that of NADPH oxidation. Inhibition was generally not dependent on duration of gari feeding. The site of inhibition of electron transfer was probably between the reduced prosthetic groups (flavin adenine dinucleotide and flavin mononucleotide) and cytochrome C (P-450). (AS)

118

26390 ONONOGBU, I.C. ; OKPARA, G.C. 1986. Effect of gari diet on lecithin: cholesterol acyltransferase (LCAT) in rats. Nutrition Reports International 33(1):79-87. Engl., Sum. Engl., 22 Refs., Illus NE Res. Ingl., 22 Refs., Ilus. [Dept. of Biochemistry, Univ. of Nigeria, Nsukka, Nigeria]

Cassava. Gari. Laboratory animals. Clinical manifestations. Enzymes. HCN. Diets. Nigeria.

The effect of gari diet on the enzyme lecithin:cholesterol acyltransferase (LCAT) in albino rats was investigated. Analysis involved the measurement of plasma and liver free, total, and esterified cholesterol as well as lecithin and lysolecithin, which are the blood constituents most involved in LCAT activity. In the gari-fed rats, plasma and liver cholesterol esterification was decreased (P less than 0.05). Although cholesterol esterification was lecithin-dependent in the plasma, liver cholesterol esterification was lecithin-independent. In both the gari-fed and the control rats, there was an increase in protein conen. in both plasma and liver. The lowering of LCAT activity by gari may contribute, therefore, to some of the lipoprotein abnormalities found in communities that subsist on gari. (AS) See also 166 167 178 180 182

H02 Nutritive Disorders in Humans

119

26879 DAVIDSON, J.C. 1980. Dietary cyanide and tropical malnutrition diabetes. Diabetes Care 3(6):703. Engl., 2 Refs.

Cassava. Cyanides. Human nutrition. Human health. Diets. Malnutrition. Zambia.

Brief information is provided on a diabetic survey carried out in a cassava-eating area of Zambia. A prevalence of 1 percent diabetes was found in surveyed households. The diagnosis of diabetes was confirmed in 23 of 69 patients registered at a small mission hospital. An assessment of the nutritional status of the population by wt., height, and skinfold thickness revealed that 3/4 of the men and almost half of the women were below the 60 percent standard skinfold thickness. A total daily calorie intake of 1439, 93 percent of which was cassava, was also found. A possible involvement of cassava cyanide is suggested. (CIAT) See also 118 148 151

H03 Animal Feeding

120

26865 ADAMSON, I. ; MBAJIORGU, N. 1985. Tissue lipids and intestinal ATPases in rabbits fed cassava (Manihot uttilisima) and plantain (Musa paradisica) diets. Nutrition Research 5(12):1359-1373. Engl., Sum. Engl., 45 Refs., Illus. [Dept. of Biochemistry, Univ. of Benin, P.M.B. 1154, Benin City, Nigeria]

Cassava. Rabbits. Feeds and feeding. Plantain. Animal health. Enzymes. Fibre content. Feed constituents. Timing. Lipids. Nigeria.

The effect of 2 vegetable sources of dietary fiber from Africa, plantain and cassava, on lipid metabolism and intestinal ATPases in cholesterol-fed rabbits was studied. In an 8-wk. expt., it was shown that both sources of dietary fiber are capable of reducing serum cholesterol levels in rabbits by diverting cholesterol from the blood to the liver. The dietary fiber from plantain had more effect. When the rabbits were switched from test to control and back to the test diets only those on plantain diet maintained a steady state level of serum cholesterol. The other diets caused a drop in serum cholesterol levels in the absence of dietary cholesterol and a sharp rebound on the introduction of cholesterol-based diets. Cassava diet was hypertriglyceridimic at all times. The ATPases were highly elevated in the ileum of rabbits fed the cassava diet and this was associated with the higher content of insoluble and particulate components of cassava, which may cause cell sloughing and alteration in the morphology of the intestine. Also, because the available minerals will be distributed between those that will physically interact with dietary fiber and those to be transported, a rise in specific activity of the vectorial enzyme was stimulated to meet the challenge of competition for minerals. (AS)

121

26769 ANDAYANI, S. ; SUSANTO, S.; ERLINA, H. 1985. Penggunaan tepung ubi kayu sebai bahan penyusun ransun ternak ayam pedaging. (Use of cassava flour in rations for broilers). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia. 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.164-172. Indon., Sum. Indon., Engl., 5 Refs.

Cassava. Poultry. Cassava flour. Nutritive value. Animal health. Feed constituents. Feed mixtures. Indonesia.

The feasibility of using CF in rations for broilers was studied and its

effect on broiler performance was determined. Ninety-six male Indian River broilers, 5-wk.-old and with an initial av. wt. of 896.46 g, were used. Treatments consisted of 4 different percentages of CF in the total ration (0, 5, 10, and 15 percent). Each treatment was placed into 6 blocks according to the location of the poultry run. Feed intake, body wt. gain, and feed conversion were observed for 4 days. The feed ration and water were given ad libitum. Best results were obtained with the 2nd treatment: 3952.58 g, 1170.84 g, and 3.38 for feed consumption, body wt. gain, and food conversion, resp. (AS)

122

26849 APARICIO T., M.A. 1983. Evaluación de harina de yuca con bajo y alto contenido de cianuro en dieta para pollos de engorde. (Evaluation of low- and high-cyanide cassava meal diets for broiler chicks). Tesis Zooteenista. Palmira, Universidad Nacional de Colombia. 118p. Span., Sum. Span., Engl., 52 Refs., Illus.

Cassava. Feeds and feeding. Chicks. HCN. Cassava meal. Feed constituents. Cassava leaf meal. Animal physiology. Aflatoxin. Toxicology. Feed mixtures. Costs. Colombia.

At the U. Nacional in Palmira, Colombia, 2 expt. were conducted to assess the possible toxic effects of high levels of cyanide in CM when used in diets for broiler chicks. In the 1st expt. (5 treatments, 4 replications), 2 CM, one with a low and the other with a high cyanide content, were evaluated at 2 levels of inclusion in the exptl. diets (20 and 40 percent). In the 2nd expt. (4 treatments, 4 replications), CM was used at 3 levels in the diets (10, 20, and 30 percent). In both expt., 3 percent cassava foliage meal was additionally incorporated. Except for a commercial diet fed in the 2nd expt., all the diets were balanced to least-cost by linear programing. Wt. gain, feed intake, and feed conversion (wt. gain/feed intake) were recorded every 2 wk., and data of the starting (0-4 wk.), finishing (4-7 wk. in the 1st and 4-8 wk. in the 2nd expt.), and whole fattening period (0-7 and 0-8 wk., resp.) were analyzed by variance analysis. Whole root CM, obtained by natural solar drying, showed a total cyanide concn. of 25-29 mg/kg and those obtained by artificial drying, 300-329 mg/kg. Total cyanide concn. for cassava foliage meal varied from 83 to 145 mg/kg. Results of the 1st expt. showed that the final live wt./chick decreased as the level of cyanide in the diet increased. As the level of CM in the diet increased from 20 to 40 percent, feed intake decreased, due probably to the levels of CM and cyanide per se; this was evidenced by a similar feed intake (P greater than 0.05) to that of groups fed diets with 40 percent CM, regardless of their cyanide content (3607 vs. 3553 g for CM with low and high cyanide levels, resp.). Results of the 2nd expt. indicated a marked superiority in growth rate from the 2nd wk. onward of those chicks fed the commercial diet. These results suggest that increasing levels of CM and cyanide did not affect diet consumption, but growth patterns suggest an adverse effect of cyanide on diet digestibility and feed conversion. The high mortality rate observed in both expt. was not correlated with the diet cyanide content. Except for SCN concn. in blood serum, hematological parameters and thyroid wt. were not affected by the cyanide level in the diet. (AS (extract))

123

26868 BREGEAT, M. 1986. Fattening young steers with cassava and Leucaena. Alafua Agricultural Bulletin 11(1):45-49. Engl., 2 Refs., Illus. [Inst. d'Elevage et de Médecine Vétérinaire des Pays Tropicaux, B.P. 186, Noumea, New Caledonia]

Cassava. Feeds and feeding. Cattle. Leucaena. Beef cattle. Diets. Nutritive value. New Caledonia.

A smallholder-scale fattening trial was conducted at the Institut d'Elevage

et de Médecine Vétérinaire des Pays Tropicaux in Port-Laguerre, New Caledonia. Three young Charolais x Limousin steers (av. live wt. of 345 kg) were housed in small fenced paddocks and given a mixture of green grass + chopped fresh cassava roots + Leucaena branches + salt as feed. Cassava was totally consumed (7.8 kg/steer/day), green grass 10 percent (8.4 kg/steer/day), and Leucaena branches up to 30 percent (8.8 kg/steer/day). Av. daily gain was 856, 739, and 8889 g for the 3 animals in 183, 118, and 183 days, resp.; the total intake of cassava fresh matter was 3895 kg, with 1950 forage units (1 forage unit = 1650 calories for beef fattening). The digestible protein:energy ratio was about 97. A better growth rate could be achieved by increasing the level of cassava and decreasing that of green grass so that the DM intake/100 kg live wt. could exceed 1.6 kg, while maintaining a digestible protein:energy ratio of at least 80. All the constituents of this feed, except salt, are home-produced. (CIAT)

124

25798 DOMINGUEZ, P.L. 1985. Utilización de la yuca como fuente de energía en la alimentación de los cerdos. (Use of cassava as energy source in swine nutrition). Asociación Cubana de Producción Animal no.2:14-16. Span., Illus.

Cassava. Feed constituents. Swine. Cuba.

The chemical composition and nutritional value of cassava as animal feed, especially as a source of energy, is briefly reviewed. A trial was conducted in Cuba with 276 pigs (initial live wt. of approx. 47 kg), which were divided into 3 equal groups that received 3 different diets during 91 days: (1) fresh ground cassava cv. Señorita (47.4 percent) + commercial concentrate (52.6 percent); (2) cassava (16.2 percent) + commercial concentrate (29.1 percent) + mixture of processed wastes and molasses (54.7 percent); (3) commercial concentrate (30.0 percent) + mixture of processed wastes and molasses (70.0 percent). The final live wt. and gains were higher for treatments 1 (92.6 and 0.55 kg/day, resp.) and 2 (92.0 and 0.54 kg/day, resp.) than for treatment 3 (85.8 and 0.47 kg/day, resp.). Feed conversion rates were 4.36, 4.92, and 5.49 for treatments 1, 2, and 3, resp. Increases in live wt. gains were due to a higher feed efficiency of cassava-based diets, perhaps related to the high digestibility of cassava. Including fresh cassava as a substitute for the mixture of processed wastes and molasses is convenient from an animal performance viewpoint since wt. gains increased by approx. 70 g/day. (CIAT)

125

26831 EKPENYONG, T.E. ; OBI, A.E. 1986. Replacement of maize with cassava in broiler rations. Archiv fuer Gefluegelkunde 50(1):2-6. Engl., Sum. Engl., Germ., Fr., Rus., 22 Refs. [Dept. of Animal Science, Univ. of Ibadan. Ibadan, Nigeria]

Cassava. Poultry. Feeds and feeding. Nutritive value. Cassava meal. Feed constituents. Feed mixtures. Productivity. Animal health. Nigeria.

Three levels of cassava-based diets (0, 37.5, and 50.0 percent cassava) were supplemented with 3 levels of Zn to determine their effects on broiler performance. Cassava roots were previously peeled, grated, squeezed, and sun-dried. Zn supplementation had little effect on wt. gain efficiency. Feed intake increased with increase in cassava level and the addition of 50 ppm Zn. Carcass quality was affected by dietary treatment. There was a Zn x cassava interaction on dressing percentage, plucked wt., and abdominal fat. Abdominal fat decreased as levels of cassava and Zn increased. Although 50.0 percent cassava supplemented with 50 ppm Zn gave optimum results, diets with 37.5 percent cassava supplemented with 100 ppm Zn were satisfactory. (AS)

126

26756 FIOCRE-ISSARTEL, F. 1981. Consequences economiques de la substitution du manioc aux cereales dans l'alimentation des porcins. (Economic consequences of substituting cassava for cereals in swine feeding). These Doctorat. France, Ecole Nationale Vetérinaire d'Alfort. 74p. Fr., 27 Refs., Illus.

Cassava. Feeds and feeding. Swine. Costs. Feed constituents. Statistical data. France.

The economic effects of substituting cassava for cereals (mainly barley) in swine rations in the EEC and France (1981) are analyzed. The use of cassava as swine feed tends to increase as the EEC presently commercializes only 40 percent of the overall production of cassava (116 million t). The role of cassava in Thailand, the main exporter country of pellets and chips, and its use (15, 30, and 40 percent) in cassava-based rations for pigs are examined. The economic interest of cassava is related to the quality of the product upon its arrival in Europe. The costs of using cassava are analyzed at the pig breeders' level. They depend on 4 factors: price of cassava, prices of soybeans and barley, and the consumption index value. The main points of disagreement between cereal and feed producers are discussed: (1) the unwanted dependency of EEC on foreign products; (2) the resulting unfavorable trade balance; (3) marked distortions between pig breeders and the EEC regarding the supply and the monetary exchange rate. (CIAT)

127

22036 GOMEZ, G. ; VALDIVIESO, M. 1983. Cassava meal for baby pig feeding. Nutrition Reports International 28(3):547-558. Engl., Sum. Engl., 16 Refs. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Feeds and feeding. Piglets. Feed constituents. Swine. Cassava meal. Dry matter. Feed mixtures. Sorghum. HCN. Costs. Colombia.

Two palatability tests with baby pigs fed diets containing different levels of CM (0, 14, and 28 percent and 0, 20, and 40 percent for expt. 1 and 2, resp.) throughout the lactation and postweaning (42-56 days) periods were performed using a free choice method. A comparison of cassava- and sorghum-based diets for baby pigs and lactating sows by the single feed method was also evaluated. There was a definite baby pig preference for diets containing the highest proportions of CM throughout the entire exptl. period. Both expt. showed a consistent improvement of dietary CP in vitro digestibility associated with the increasing levels of inclusion of CM in the diets. However, there was no significant difference between the cassava- and sorghum-based diets when they were compared by the single feed method. The exptl. results clearly indicate that CM is an excellent carbohydrate source for pig feeding in improving the palatability and the digestibility, notably of CP, of baby pig diets. Baby pig diets containing 40 percent CM performed similar to those based on sorghum. (AS)

128

26812 HASSAN, S.A. ; BRYANT, M.J. 1986. The response of store lambs to protein supplementation of a roughage-based diet. Animal Production 42(1):73-79. Engl., Sum. Engl., 21 Refs. [Dept. of Agriculture & Horticulture, Univ. of Reading, Earley Gate, Reading RG6 2AT, England]

Cassava. Feeds and feeding. Sheep. Animal health N. Feed constituents. Feed mixtures. Analysis. United Kingdom.

The response of 35-kg store lambs to diets containing increasing rumen-undegradable N concn. was measured by live wt. gain and N balance. A range of undegradable N concn. from 2.4 to 7.2 g/kg dietary DM was achieved by supplementing a basal diet of NaOH-treated barley straw. Cassava (145-239 g/kg DM), extracted rapeseed meal, and minerals with both formaldehyde-

treated rapeseed meal and fish meal. Sufficient diet to provide maintenance and a growth rate of 150 g/day was given to the lambs, according to live wt. Increasing levels of undegradable N promoted a linear increase in live wt. gain and N retention. However, the response to fish meal was greater than that for formaldehyde-treated rapeseed meal. (AS)

129

26726 KALBANDE, V.H. ; KADUSKAR, M.R.; THATTE, V.R.; KHIRE, D.W. 1984. Non-cereal rations for broilers. Indian Journal of Poultry Science 19(4):270-271. Engl., 5 Refs. [Nagpur Veterinary College, Nagpur-440 006, India]

Cassava. Feeds and feeding. Chicks. Feed constituents. Costs. Animal nutrition. India.

Diets based on rice polishings with 18 percent CM, or 5 percent CM with 5 percent sal seed (Shorea robusta) meal were given to broilers from 1 wk. until 8 wk. old. A maize-based diet (58 percent maize) was used as control. Broilers given the maize-based diet had greatest wt. gains and meat yields. (Nutrition Abstracts and Reviews)

130

26175 KLOOSTER, A.T. VAN'T ; MALESTEIN, A.; PRINS, R.A. 1983. Composition of feedstuffs and DL-lactic acid accumulation in the rumen. Zeitschrift fuer Tierphysiologie Tierernaehrung und Futtermittelkunde 50(1-2):2-4. Engl.,

Cassava. Lactic acid. Animal health. Feed mixtures. Glucose. Fructose. Sugar content. Carbohydrate content. United Kingdom.

The results of in vitro and in vivo expt. with 7 feedstuffs, including cassava, to determine their effect on rumen acidosis and dextro-levo lactic acid accumulation are reported. When feedstuffs used were ranked with respect to lowest pH and highest lactic acid concn. observed, relative to the values of citrus pulp (100 percent), cassava ranked last at a 16 percent level. The sequence in vitro agreed with that in vivo. The potential risk of in vivo acidosis was highly correlated with the sum of glucose + fructose and soluble protein content of the feeds. When mixtures of 2 or more feedstuffs were administered into the rumen, pH levels were lower and lactate concn. higher than the values calculated based on the assumption that the influences of the single feedstuffs on the parameters were additive. Thus, the risk of lactic acid acidosis of single feedstuffs can be predicted from in vitro incubations of them, but not that of feed mixtures. (CIAT)

131

26767 KOENTJOKO 1985. Daun ubi kayu untuk makanan babi dan ayam. (Use of cassava leaves for feeding swine and chicken). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.128-137. Indon., Sum. Indon., Engl., 22 Refs.

Cassava. Leaves. Feeds and feeding. Composition. Protein content. Cassava products. Cyanogenic glucosides. Swine. Chicks. Animal health. Indonesia.

The use of cassava leaves as animal feed is reviewed regarding production and composition in swine and chicken rations. It was found that cassava can not be used in more than 10 percent of the ration. Cassava leaves are a source of protein for swine and chicken. Limiting factors are met., energy, fiber, and cyanide contents. (AS)

132

26766 KOENTJOKO 1985. Ubi kayu untuk pakan ternak. (Use of cassava as

animal feed). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.116-127. Indon., Sum. Indon., Engl., 24 Refs.

Cassava. Feeds and feeding. Nutritive value. Cyanogenic glucosides. Carbohydrate content. Amino acids. Animal health. Indonesia.

The use of cassava as animal feed and its chemical composition are reviewed. It was found that cassava can substitute almost all cereals in animal rations if carefully formulated in order to meet nutrient requirements. (AS)

133

26822 KUNJIKUTTI, N. ; KURIAN, A.; THOMAS, C.T.; JAMES, C.S. 1984. Energy requirements of adult female Malabari goats for maintenance. Kerala Journal of Veterinary Science 15(2):79-85. Engl., Sum. Engl., Arm., 12 Refs. [Dept. of Nutrition, College of Veterinary & Animal Sciences, Mannuthy, Trichur, India]

Cassava. Feeds and feeding. Goats. Diets. Animal health. Feed constituents. Feed mixtures. Animal physiology. India.

For 125 days twelve 4 to 5-yr-old female Malabari goats were given diets based on jack (Canavalia ensiformis) leaves and 70, 100, or 120 g CF, resp., to provide 75, 100, or 125 percent of a feeding standard (41 g digestible CP and 409 g starch/45 kg body wt.). All goats given 75 or 100 percent of the feeding standard lost wt.: initial wt. were 26.1 and 26.6 kg and final wt. were 23.2 and 25.4 kg, resp. Total daily digestible nutrient requirement for maintenance was 8.73 plus or minus 0.34 g/kg body wt., corresponding to 7.59 plus or minus 0.30 g starch equivalent. (Kerala Journal of Veterinary Science)

134

26780 OCHOA R., P.E. 1979. Estudio de los componentes nutritivos del Erinnyis ello. (Study of the nutritional components of Erinnyis ello). Tesis Quimico. Bucaramanga, Colombia, Universidad Industrial de Santander. 120p. Span., 25 Refs., Illus.

Cassava. Erinnyis ello. Feeds and feeding. Carbohydrate content. Protein content. Tryptophane. Enzymes. Hydrolysis. Alanine. Arginine. Cystine. Glycine. Histidine. Lysine. Methionine. Threonine. Tyrosine. Valine. Laboratory experiments. Colombia.

The nutritional components of Erinnyis ello, a serious cassava pest, are analyzed to study the possibility of preparing E. ello flour for use in animal nutrition. The proximal analysis (dry basis) indicated 1.50 percent soluble carbohydrates, 0.40 percent pentose, 4.00 percent hexose, 22.28 percent lipid, 64.23 percent protein, and 7.56 percent ash. E. ello is not a good source of energy due to its low carbohydrate content and intermediate saturated fatty acid concn. The var. of amino acids that E. ello contains makes it attractive for use as animal feed since essential amino acids such as lysine and met. are available at considerably high levels (8.8 and 10.1 g/100 g protein, resp.). Of the minerals, only Mg was found to be at adequate levels. Further studies are recommended, especially regarding E. ello flour digestibility, mass rearing and industrial production, vitamin composition, and separation of fatty acids (stearic and oleic). (CIAT)

135

26851 OLIVEIRA, J.P. DE ; TIESENHAUSEN, I.M.E.V. VON; FALCO, J.E.; CORREA, H.; MUNIZ, J.A.; CARVALHO, V.D. DE 1984. Composicao quimica e consumo voluntário do feno e da silagem da parte aérea da mandioca (Manihot

esculenta Crantz). (Chemical composition and voluntary intake of hay and silage from cassava aerial parts). Ciencia e Prática 8(2):203-213. Port., Sum. Port., Engl., 31 Refs., Illus.

Cassava. Feeds and feeding. Sheep. Leaves. Stems. Foliage. Feed constituents. Dry matter. Protein content. Fibre content. Silage. Brazil.

The voluntary intake and chemical composition of hay and silage made of the aerial part of 1-yr-old cassava cv. IAC 12-829, were evaluated at the Escola Superior de Agricultura de Lavras (Minas Gerais, Brazil) during 1982-83. Four treatments were studied, namely, T1, hay of the whole aerial part; T2, silage of the whole aerial part; T3, hay of the upper third of the whole aerial part; and T4, silage of the upper third of the aerial part. The chemical composition of multiple samples offered to sheep was determined using the following parameters: DM, CP, crude fiber, soluble carbohydrates, Ca, P, GE, and pH. Twenty wethers were kept for 21 days in individual metabolic cages in order to estimate voluntary intake using a randomized block design with 5 replications and 4 treatments. DM voluntary intake, digestible DM, digestible protein, and digestible energy were determined. Better quality was achieved, both with silage or hay, by using the upper third of the aerial part. Voluntary intake of protein was higher with silage. (AS)

136

26745 PHALARAKSH, K. 1984. The feasibility studies of geese production in the Northeast of Thailand. Memoirs of the Tokyo University of Agriculture 26:186-247. Engl., Sum. Engl., 118 Refs., Illus. [Dept. of Animal Science, Khon Kaen Univ., Khon Kaen, Thailand]

Cassava. Geese. Feeds and feeding. Poultry. Economics. Costs. Prices. Feed mixtures. Leaves. Cassava meal. Processed products. Animal health. Dry matter. Protein. Thailand.

A series of 9 expt. was conducted over 6 yr to provide significant information on egg production rate, reproductive rate, nutrition, and the appropriate husbandry of geese to the government should goose production be promoted in NE Thailand. The research results will be used to develop and improve goose production in Thailand and possibly other developing countries with similar climatic environments and resources, as well. The final target is to provide extra income and animal protein for human consumption. Expt. 3 tried to visualize utilization of the surplus cassava leaves in the goose production. In a completely randomized design with 5 treatments (0, 10, 20, 30, and 40 percent CM in the goose ration) and 4 replications, 80 female Grey Chinese goslings were fed from 4 to 14 wk. of age. It was concluded that the greater percentages of CLM incorporated in the rations showed more adverse effects on body wt. and feed conversion, presumably due to HCN toxicity. On the other hand, considering the economic point of view, using CLM at a 20 percent level in the ration gave the min. feed cost/kg body wt. gain. (AS (extract))

137

26389 RAJAGURU, S.B. ; RAVINDRAN, V. 1985. Metabolisable energy values for growing chicks of some feedstuffs from Sri Lanka. Journal of the Science of Food and Agriculture 36(11):1057-1064. Engl., Sum. Engl., 43 Refs. [Dept. of Animal Science, Univ. of Peradeniya, Peradeniya, Sri Lanka]

Cassava. Nutritive value. Feeds and feeding. Food energy. Chicks. Metabolism. Feed constituents. Toxicity. HCN content. Cassava meal. Animal health. Sri Lanka.

Seven biossays were conducted with 600 1-wk.-old White Leghorn cockerels to determine the zero N-corrected ME values of 23 Sri Lankan-produced feedstuffs. The N-corrected ME values (MJ/kg DM) of the feedstuffs were:

maize 14.28, sorghum 14.42, broken rice 12.35, rough rice 9.21, rice bran grade I 14.28, rice bran grade II 9.30, wheat feed flour 9.31, wheat bran 7.66, undetoxified CM 13.38, detoxified CM 15.92, coconut oil meal 7.46, sesame oil meal 11.48, rubber seed meal 11.25, kapok seed meal 8.75, urd bean 12.68, CLM 7.82, local fish meal 11.97, skim milk powder 10.41, meat and bone meal 8.02, sugar filter-press mud 8.85, cocoa husk meal 7.46, mango seed kernel meal 10.84, and tea refuse 6.02. The difference between the N-corrected ME values of undetoxified and detoxified CM indicate that HCN interfers with energy utilization in poultry. (AS)

138

26706 RAO, K.N. ; PRASAD, D.A.; KRISHNA, N. 1985. Development and nutritional evaluation of extruded tapioca flour and urea product (tapurea-70). Cheiron 14(3):104-112. Engl., Sum. Engl., 16 Refs. [Dept. of Animal Nutrition, College of Veterinary Science, Andhra Pradesh Agricultural Univ., Tirupati-517 502, India]

Cassava. Tapurea. Nutritive value. Processing. Cassava flour. Cassava chips. Urea. N. Diets. Feeds and feeding. Protein enrichment. Animal physiology. Proteins. Cattle. India.

Extrusion cooking of tapurea-70 (cassava and urea 77:23) increased (P less than 0.01) swelling potential, reducing activity, and microbial protein synthesis and reduced (P less than 0.01) ammonia N production in vitro. In a 3 x 3 Latin square expt. with crossbred bullocks, extrusion cooking lowered (P less than 0.01) rumen NH3-N concn. at 4 and 6 h after feeding but did not affect blood NH3-N or blood urea-N. In a 2nd expt. with young Nellore rams, extrusion cooking lowered (P less than 0.01) ether extract digestibility but did not affect digestibility of DM, crude fiber, N-free extract and N, or N retention. Extrusion cooking significantly lowered (P less than 0.01) rumen NH3-N and blood urea-N concn. (AS)

139

26853 REDDY, E.P. ; PRASAD, D.A. 1985. Evaluation of economic concentrate mixtures for dairy cattle. Cheiron 14(4):164-172. Engl., Sum. Engl., 13 Refs. [Dept. of Animal Nutrition, College of Veterinary Science, Andhra Pradesh Agricultural Univ., Tirupati-517 502, India]

Cassava. Feeds and feeding. Dairy cattle. Feed constituents. Feed mixtures. Costs. N. Animal health. Animal physiology. India.

Three isonitrogenous and isocaloric concentrate mixtures using mostly unconventional ingredients were formulated with rumen degradable protein values of 0.38 (mixture 2, 5 percent cassava), 0.36 (mixture 3, 15 percent cassava) and 0.38 (mixture 4, 0 percent cassava) and compared with a conventional mixture (mixture 1, 0 percent cassava) having a rumen degradable protein value of 0.29 in in vivo expt. In a 56-day growth expt. with 16 crossbred calves (143 kg), av. daily gain of calves fed mixtures 3 or 4 was higher (P less than 0.01) than those fed mixtures 1 or 2. Feed efficiency was superior for mixture 4 than for mixtures 1 or 2. Av. daily gain and feed efficiency (kg concentrate mixture DM/kg gain) for mixtures 2 and 3 were 518 plus or minus 50 and 732 plus or minus 439 and 4.45 plus or minus 0.48 and 3.11 plus or minus 0.18, resp. The cost/kg gain was lower by 21, 39, and 45 percent in calves fed mixtures 2, 3, and 4, resp., than those fed mixture 1. In a 4 x 4 Latin square N balance expt. with crossbred male calves (166 kg), N retention was higher (P less than 0.05) in calves fed mixtures 2 or 4 than those fed mixture 1. In a 4 x 4 Latin square expt. with fistulated Ongole x Holstein Friesian bullocks (430 kg), rumen NH3-N concn. at 2 (P less than 0.05), 4 (P less than 0.01), or 6 (P less than 0.01) h after feeding was lower in bullocks fed concentrate mixtures 2, 3, and 4 than those fed mixture 1. Differences in total VFA concn. among the treatments were not significant. The blood urea N values in bullocks fed

mixture 4 were lower (P less than 0.05) at 2 or 6 h after feeding than those fed mixture 2. (AS)

140

26729 TEWE, O.O. ; KASALI, O.B. 1986. Effect of cassava peel processing on the performance, nutrient utilization and physiopathology of the African giant rat (Cricetomys gambianus Waterhouse). Tropical Agriculture 63(2):125-128. Engl., Sum. Engl., 22 Refs. [Dept. of Animal Science, Univ. of Ibadan, Nigeria]

Cassava. Cortex. Animal physiology. Fermentation. Metabolism. Drying. HCN. Thiocyanates. N. Fermented products. Feed constituents. Endemic goitre. Diets. Laboratory animals. Digestibility. Nigeria.

Four diets were prepared that contained 31.12 percent of either maize (diet 1) or processed cassava peel, which was sun dried, oven dried, or fermented, constituting diets 2-4, resp. They were fed to weanling giant rats in a 4 -day trial. HCN contents of the rations were C, 130.20, 595.20, and 42.16 ppm, resp. Performance was best on diet 1 and poorest on diet 3. ME and N retention were poorer in giant rats fed the cassava peel rations. Serum and urinary SCN values were higher (P less than 0.01) in the giant rats fed either diet 2 or 3 than in those fed diet 1 or 4. Cyanide intake was significantly (P less than 0.05) correlated with daily wt. gain, serum protein, urea, SCN, urinary SCN and N retention values. There were no gross or histological lesions in the tissues in any of the test animals. (AS)

141

26840 THOMAS, M.M. ; EASTERSON, D.C.V.; KATHIRVEL, M. 1984. Energy conversion in the prawn Metapenaeus dobsoni (Miers) fed on artificial feed. Indian Journal of Fisheries 31(2):309-312. Engl., Sum. Engl., 3 Refs. [Central Marine Fisheries Research Inst., Cochin, India]

Cassava. Fish. Metapenaeus dobsoni. Diets. Nutritive value. Animal physiology. Energy productivity. Feeds and feeding. Animal health.

Measured quantities of feed containing 33.33 percent (wt.) CF, 16.67 percent rice bran, 41.67 percent of fish meal, and 8.33 percent mineral supplements (Starmin PS), made into pellets using agar-agar as binding agent, were fed to Metapenaeus dobsoni. Mean gross and net conversion (growth) efficiencies were 39.62 and 49.34 percent, resp. Av. assimilation efficiency was about 80.99 percent. (AS)

142

26824 THOMAS, K. ; SINGH, R.A. 1984. Feeding pigs in tropics: 1. Effect of plane of feeding and feed particle size on growth. Kerala Journal of Veterinary Science 15(2):51-60. Engl., Sum. Engl., Arm., 16 Refs. [Dept. of Animal Management, College of Veterinary & Animal Sciences, Mannuthy, Kerala, India]

Cassava. Feeds and feeding. Swine. Feed constituents. Composition. Feed mixtures. Costs. Animal health. Fattening. India.

For 170 days 36 Large White pigs, initially weighing 11.2 kg and 70 days old, were given diets with 100, 90, or 85 percent of the recommended amounts of digestible energy, and with particle size of feed 2-3 mm or less than 1 mm in diameter. Feed was based on dried cassava chips, groundnut oilmeal, and maize, and was given freely for 2 1-h periods daily. Different particle size of feed did not affect wt. gain or nutrient digestibility. There was a significant reduction in daily wt. gain and in digestibilities of DM, OM, ether extract, crude carbohydrates, and CP with decreasing

amounts of dietary digestible energy. (Kerala Journal of Veterinary Science)

143

26823 THOMAS, K. ; SINGH, R.A. 1984. Feeding pigs in tropics: 2. Effect on plane of feeding and carcass characteristics. Kerala Journal of Veterinary Science 15(2):61-68. Engl., Sum. Engl., Arm., 23 Refs. [Dept. of Animal Management, College of Veterinary & Animal Sciences, Mannuthy, Kerala, India]

Cassava. Swine. Feeds and feeding. Diets. Production. Animal health. India.

For 170 days 36 Large White pigs (initially weighing 11.2 kg at 70 days old) were given diets based on dried cassava chips, groundnut oilmeal, and maize to provide 100, 90, or 85 percent of the recommended amount of digestible energy with particle size of feed 2-3 mm or less than 1 mm in diameter. Particle size of feed had no significant effect on pig performance. Dressing percentage, carcass length, eye muscle area, and backfat thickness decreased with decreasing amounts of dietary digestible energy. (Kerala Journal of Veterinary Science)

144

26817 TUAH, A.K. ; TAIT, R.M. 1985. Protein metabolism of sheep fed formaldehyde treated forage supplemented with iso-acids and sulfur. Nutrition Reports International 32(4):893-900. Engl., Sum. Engl., 14 Refs. [Faculty of Agriculture, Univ. of Science & Technology, Kumasi, Ghana]

Cassava. Feeds and feeding. Sheep. Proteins. N. Feed constituents. Feed mixtures. Analysis. Dry matter. Animal health. Animal physiology. Biochemistry. Canada.

The effects of formaldehyde treatment of dehydrated forage with and without supplements of S and iso-acids on protein utilization were assessed at the U. of British Columbia (Canada). Twenty-five Dorset ram lambs (av. wt. 29 kg) were allocated to 5 diets, all of which contained 50 percent dehydrated forage and approx. 38 percent cassava. Diet I contained untreated forage while diets 2 to 5 contained forage treated with 1 percent (wt./wt.) formaldehyde. Diet 3 was supplemented with isovaleric and isobutyric acids, diet 4 was supplemented with S, and diet 5 with boths and the iso-acids. N balance was improved significantly (P less than 0.05) by formaldehyde treatment as a result of reduced (P less than 0.05) urinary N excretion. The nonprotein and microbial protein percentages of abomasal contents were reduced (P less than 0.05) by formaldehyde treatment indicating a greater proportion of dietary protein having escaped degradation in the rumen. The molar proportions of acetic, propionic, and butyric acids in rumen fluid were not affected (P more than 0.05) by treatment. (AS)

145

26816 TUDOR, G.D. ; McGUIGAN, K.R. 1985. The effects of three protein sources on the growth and feed utilization of cattle fed cassava. Journal of Agricultural Science 104(1):11-18. Engl., Sum. Engl., 24 Refs., Illus. [Queensland Dept. of Primary Industries, Animal Research Inst., Yeerongpilly, Brisbane, 4105, Australia]

Cassava. Feeds and feeding. Cattle. Feed constituents. Feed mixtures. Dry matter. Composition. Animal health. Australia.

The nutritive value of diets predominantly of dried cassava tubers supplemented with protein concentrates and roughage was measured in 3 expt. using steers. In expt. 1 the digestibility of diets of dried, chipped cassava tubers and tops (80:20) or rolled sorghum grain and cotton seed hulls, supplemented with 4 or 8 percent groundnut meal and urea, was

determined. The apparent digestibility coefficients of OM of the cassava diets with 4 or 8 percent groundnut meal, were significantly (P less than 0.01) higher than those of the grain diets. Starch digestibility in the cassava diets was significantly (P less than 0.01) higher than in the grain diets (1.00, 0.99, 0.94, and 0.93, resp.). There were no significant differences in the digestibility of the N component. The N retained (g/day) was lower (P more than 0.05) with cassava and was utilized less efficiently (P more than 0.05). The high apparent digestibility of the cassava diet suggests that cassava could replace cereal grain in intensive finishing diets. The N retention data suggest that groundnut meal is no better than urea as a N source. In expt. 2, 15 steers with a mean initial wt. of 173 kg were individually fed pelleted diets of sorghum grain, cassava + urea, or cassava + meat and bone meal (90 concentrate:10 roughage). The cattle fed the grain diet ate significantly more OM and grew faster and slightly more efficiently than cattle fed cassava + urea. Cattle fed cassava + meat and bone meal were intermediate between the 2 treatments for intake and daily gain (3.7 and 1.06 kg/kg, resp.) but had the best feed conversion (3.5 kg/day). the acetic:propionic acid ratio was similar on all 3 diets (1.2, 1.6, and 1.4:1, resp.), but the ratio of propionic:butyri was significantly (P less than 0.01) different (5.8, 2.7, and 2.7:1, resp). In expt. 3, 15 other steers with mean initial wt. of 195 kg were individually fed pelleted cassava diets with 0, 5, or 10 percent fishmeal (82 cassava:18 roughage). The intake of OM, daily live wt. gain, and feed conversion were all better in cattle fed cassava with fishmeal. The proportions of VFA in the rumen fluid were similar to those recorded in cassava-fed cattle in the earlier trial. It was concluded that cattle fed high-energy diets based on dried cassava tubers can perform well. Although feed intake and daily grin of cattle fed cassava may be lower than for cattle fed grain diets, the conversion of food to live wt. gain should be similar or better. (AS)

146

26384 WANAPAT, M. ; PRASERDSUCK, S.; CHANTAI, S. 1985. Efecto de ensilaje de paja de arroz con urea y suplementación con hojas de yuca secas sobre la digestión de bufalos de agua. (Effect of rice straw ensilage with urea and supplement with dry cassava leaves on the digestion of water buffalos). Producción Animal Tropical 10(1):46-52. Span., Sum. Span., 16 Refs. [Dept. of Animal Science, Khon Kaen Univ., Khon Kaen 4000, Thailand]

Cassava. Water buffalo. Feeds and feeding. Leaves. Silage. Dry matter. Protein content. Composition. Thailand.

The effects of rice straw ensiled with urea and a min. amount of dry cassava leaves on the digestibility of straw and the wt. change in yearling buffalos were studied. A 3 x 3 Latin square design with 6 animals was used. The treatments were: (a) nontreated rice straw supplied ad libitum; (b) rice straw ensiled with urea offered in restricted amounts, based on the consumption of nontreated rice straw; and (c) rice straw ensiled with urea offered in restricted amounts, based on the consumption of nontreated rice straw + dry cassava leaves at 200 g/day. Three exptl. 7-wk. periods were used with 7 preliminary days, 14 days of adjustment, and 30-day feeding periods. Ensiling rice straw with urea during 3 wk. significatively increased DM, OM, CP, acid detergent fiber, and GE digestibilities. By supplementing rice straw ensiled with urea with a min. amount of dry cassava leaves, nutrient digestibility tended to increase (P less than 0.05). Digestion coefficients, determined by acid-insoluble ash and lignin (72 percent H_2SO_4) used as internal indicators, were comparable; however, the values obtained by lignin tended to be lower. Wt. change of the buffalos fed treatments (a), (b), and (c) were -383, 136, and 182 g/day (P less than 0.05), resp. (AS-CIAT)

147

26768 WARDHANI, N.K. ; AHMAD, M. 1985. Penggunaan ubi kayu untuk pakan

ternak. (Use of cassava as animal feed). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.138-163. Indon., Sum. Indon., Engl., 27 Refs.

Cassava. Feeds and feeding. Leaves. Feed constituents. Processed products. HCN. Waste utilization. Statistical data. Indonesia.

The use of cassava products and waste for feeding animals such as cows, buffaloes, sheep, goats, swine, and chickens is discussed. When a shortage of grasses exists, cassava leaves can be used. Fresh cassava tubers, dried cassava (gaplek), and waste (onggok) are rich sources of carbohydrates. One of the limiting factors of cassava products and waste used as animal feed is the high HCN content of the tubers. Therefore, a special treatment should be applied before they are used as animal feed. (AS) See also 148 150

H04 HCN Toxicity and Detoxification

148

26741 HERSHMAN, J.M. ; PEKARY, A.E.; SUGAWARA, M.; ADLER, M.; TURNER, L.; DEMETRIOU, J.A.; HERSHMAN, J.D. 1985. Cassava is not a goitrogen in mice. Proceedings of the Society for Experimental Biology and Medicine 180(1):72-78. Engl., Sum. Engl., 18 Refs., Illus. [Endocrine Research Laboratory, Univ. of California, Los Angeles, CA 90073, USA]

Cassava. Laboratory animals. Cyanides. Iodine. Endemic goitre. Diets. Dietary value. Animal health. Clinical manifestations. Thiocyanates. Human health. USA.

To examine the effect of cassava on the thyroid function of mice, fresh cassava roots were fed to mice and this diet was compared with a low I diet and Purina. Cassava provided a low I intake and increased urine SCN excretion and serum SCN levels. Mice on cassava lost wt. The thyroid glands of mice on cassava were not enlarged, even when normalized for body wt. The 4- and 24-h thyroid uptakes of mice on cassava were similar to those of mice on low I diets. Protein-bound ((125)I)I at 24 h was high in mice on either the cassava or low I diets. The thyroid I trap (T/M) was similar in mice on cassava and low I diets. When SCN was added in vitro to the incubation medium, T/M was reduced in all groups of mice; under these conditions, SCN caused a dose-related inhibition of T/M. The serum thyroxine (T4) and triiodothyronine (T3) concn. of mice on cassava were reduced compared with mice on Purina diet. Thyroid T4 and T3 contents of mice on cassava were relatively low compared with mice on Purina diet. Hepatic T3 content and T4 5'-monodeiodination in liver homogenates were reduced in mice on cassava compared with other groups. The data show that cassava does not cause goiter in mice. The SCN formed from ingestion of cassava is insufficient to inhibit thyroid iodine transport or organification of iodide. The cassava diet leads to rapid turnover of hormonal I because it is a low I diet. It also impairs 5'-monodeiodination of T4, which may be related to nutritional deficiency. These data in mice do not support the concept that cassava per se has goitrogenic action in man. (AS)

149

26388 NAMBISAN, B. ; SUNDARESAN, S. 1985. Effect of processing on the cyanoglucoside content of cassava. Journal of the Science of Food and Agriculture 36(11):1197-1203. Engl., Sum. Engl., 18 Refs., Illus. [Central Tuber Crops Research Inst., Sreekariyam, Trivandrum 695 017, Kerala, India]

Cassava. Cyanogenic glucosides. Cassava chips. Detoxification processes. Boiling. Drying. Solar drying. Laboratory experiments. India.

The efficiency of different processes in reducing the cyanoglucoside content of cassava was studied. Max. retention of cyanoglucoside (more than 80 percent) was observed in baked, fried, and steamed tubers. Retention in sun-dried chips varied from 30 to 60 percent, being governed by chip thickness. In case of cassava boiled in water, smaller chip size and sufficient water were found to be the ideal condition for max. cyanoglucoside removal. There was 25-75 percent retention in this process, depending on the chip size used. The most effective method for cyanoglucoside removal was by crushing fresh tubers and subsequent sun drying, whereby over 95 percent of it was eliminated. The studies indicated that the mode of processing greatly influenced the cyanoglucoside content of cassava foods. It was concluded that since cyanoglucoside can be greatly reduced by suitable processing, it may not be a limiting factor in the utilization of cassava for food and feed purposes. (AS)

150

26893 TEWE, O.O. ; MANER, J.H. 1985. Cyanide, protein and iodine interaction in the performance and metabolism of rats. Journal of Environmental Pathology and Toxicology 6(1):69-78. Engl., Sum. Engl., 15 Refs., Illus. [Dept. of Animal Science, Univ. of Ibadan, Ibadan, Nigeria]

Cassava. HCN. Laboratory animals. Animal physiology. Animal health. Iodine. Protein deficiencies. Feed constituents. Feeds and feeding. Feed mixtures. Thiocyanates. HCN absorption. Nigeria.

Performance and metabolic traits were measured in 64 growing rats fed on varying levels of dietary cyanide, protein, and I. The presence of cyanide in the diets caused a nonsignificant reduction in both feed consumption and growth rate. Moreover, on protein-deficient diets, the lowest body wt. gain was obtained in the animals with 750 ppm cyanide. I deficiency did not have any marked influence on performance. Dietary cyanide significantly increased serum and urinary SCN concn. while I deficiency caused significant reductions in serum protein-bound I. Interactions of protein deficiency and dietary cyanide also significantly reduced serum SCN concn., while interactions of the 3 dietary variables significantly reduced kidney protein content. (AS)

151

26702 UMOH, I.B. ; OGUNKOYA, F.O.; MADUAGWU, E.N.; OKE, O.L. 1985. Effect of thiamin status on the metabolism of linamarin in rats. Annals of Nutrition and Metabolism 29(5):319-324. Engl., Sum. Engl., 18 Refs. [Dept. of Biochemistry, College of Medical Sciences, Univ. of Calabar, Calabar, Nigeria]

Cassava. Thiamin. Linamarin. Animal physiology. Ataxic neuropathy. Diets. Nigeria.

The effect of graded levels of thiamin on the metabolism of linamarin was investigated in rats. It was observed that on a diet deficient in thiamin, a large amount of linamarin was recovered unchanged in the urine, together with significantly more SCN relative to the control. The least amount of SCN (P less than 0.05 relative to control) was found in animals receiving the highest amount (twice daily requirement) of thiamin in the diet, but the amount of unmetabolized linamarin was similar to the control. It is suggested that thiamin deficiency may be implicated in the etiology of tropical ataxic neuropathy through the SCN overload in people eating large amounts of cassava and cassava derivatives that contain linamarin. (AS)
See also 019 061 118 119

152

26835 KEYA, E.L. ; HADZIYEV, D. 1985. The use of cassava starch in breadmaking. Croatica Chemica Acta 58(4):473-489. Engl., Sum. Engl., Serbo-Croatian., 9 Refs., Illus. [Dept. of Food Science & Technology, Univ. of Nairobi, Kenya]

Cassava. Cassava starch. Breads. Composite flours. Wheat flour. Temperature. Timing. Organoleptic examination. Gluten. Kenya.

A breadmaking-quality wheat gluten was used in a composite flour formula of 85 percent starch and 15 percent vital gluten to assess the feasibility of using cassava starch in breadmaking. Some cassava starch technological properties, such as size, swelling power, and gelatinization, were close to those of wheat starch, whereas amylose solubility and extent of retrogradation differed. The former property had a beneficial effect on starch gluten affinity while the latter had to be rectified by forming starch clathrate compounds with alpha-crystallinity forms of C16-type monoglycerides. Therefore, wheat starch can be interchanged with cassava starch, retaining bread quality close to that of true wheat bread. Additionally, the feasibility of using cassava root flours instead of starch was also suggested. (AS)

153

26725 LEE, S.Y. ; SHIN, Y.C.; LEE, S.H.; PARK, S.S.; KIM, H.S.; BYUN, S.M. 1984. Saccharification of uncooked starch. Korean Journal of Food Science and Technology 16(4):463-471. Ko., Sum. Engl., Ko., 13 Refs., Illus. [Dept. of Biological Science & Engineering, Korea Advanced Inst. of Science & Technology, Seoul, Korea]

Cassava. Starch content. Alcohol. Steeping. Carbohydrate content. Hydrolysis. Enzymes. Particle size. Starch crops. Korea.

For alcohol production from uncooked starch, the saccharification process was examined, which uses the combined action of steeping, pectin depolymerase, alpha-amylase, and glucoamylase. Total sugar contents of rice, sweet potato, and cassava samples used were 4.53, 4.26, and 3.92 mmol/g. Whe cooked starch was saccharified under conventional conditions 70 plus or minus 10 percent of total sugar was hydrolyzed. If smaller starch particles were used, more saccharification occurred. Efficient saccharification was also obtained by treatment with 5 percent H_2SO_4 at 60 degrees Celsius for 12 h. Optimal conditions for saccharification using the exptl. process are: pectin depolymerase, pH 4.5, 45 degrees Celsius for 2 h; alpha-amylase, pH 6.0, 60 degrees Celsius, 1 h; and glucoamylase, pH 3.5, 60 degrees Celsius, 1 h. Simultaneous treatment by macerating, liquefying, and saccharifying enzymes yielded a better result than stepwise treatment. Degrees of saccharification of uncooked cassava, rice, and sweet potato were 82.0, 90.5, and 84.5 percent, resp., on the basis of total sugar, under the optimized conditions. (AS)

154

26833 MOORTHY, S.N. 1985. Acetylation of cassava starch using perchloric acid catalysis. Starch Staerke 37(9):307-308. Engl., Sum. Engl., Germ., 11 Refs. [Central Tuber Crops Research Inst., Sreekariyam, Trivandrum-695 017, Kerala, India]

Cassava. Cassava starch. Starch productivity. Temperature. Timing. Laboratory experiments. Acetylation. India.

Acetyl and propionyl derivatives of cassava starch were prepared using perchloric acid catalysis. The temp. for obtaining optimum yield and degree

of substitution was 30 degrees Celsius. The results indicate that perchloric acid catalysis can be effectively used for acylation of cassava starch. The product possesses good clarity and stability and can be used for food purposes. (AS)

155

26136 MOORTHY, S.N. 1985. Cassava starch and its modifications. Trivandrum, India, Central Tuber Crops Research Institute. Technical Bulletin Series no.4. 35p. Engl., 18 Refs., Illus. [Central Tuber Crops Research Inst., Sreekariyam, Trivandrum 695 017, India]

Cassava. Cassava starch. Modified starches. Cassava flour. Puttu. Fructose. Particle size. Starch productivity. Analysis. Composition. Industrial starches. India.

Research work to improve the properties of cassava starch for different purposes and to modify undesirable properties without affecting desirable ones is reported. Basic studies on cassava starch report data for granule size, mol. wt., X-ray diffraction pattern, nuclear magnetic resonance spectral pattern, infrared spectral features, viscosity, pasting temp., and swelling vol., power, and solubility. Modification of cassava starch is discussed. Nondegradative modifications include physical treatments, incorporation of chemicals, chemical derivation, cross linking, and oxidative reactions. Degradative reactions include the preparation of starch adhesive and fructose syrup. Gelatinized starch and modification of CF are also dealt with. (CIAT)

156

26891 SONI, P.L. ; AGARWAL, A.; AYYAR, K.S. 1984. Potentialities of underground biomass. Indian Forester 110(8):783-790. Engl., 14 Refs. [Chemistry of Forest Products Branch, Forest Research Inst. & Colleges, Dehra Dun, India]

Cassava. Production. Alcohol. Ethanol. Energy productivity. Industrial starches. Cellulose. India.

Starches obtained from three tuberous forest plants, Dioscorea ballophylla, Amorphophallus campanulatus, and Pueraria tuberosa are compared with cassava and maize starches in physicochemical properties. It is concluded that starch from these wild plants could be used in energy production (ethanol or butanol for fuel) and in the food and other industries. (AS)

157

26827 STEFFE, J.F. ; FORD, E.W. 1985. Rheological techniques to evaluate the shelf-stability of starch-thickened, strained apricots. Journal of Texture Studies 16(2):179-192. Engl., Sum. Engl., 14 Refs., Illus. [Dept. of Agricultural Engineering & Dept. of Food Science & Human Nutrition, Michigan State Univ., East Lansing, MI 48824, USA]

Cassava. Cassava starch. Nutritive value. Storage. Technology. Food thickeners. USA.

The rheological behavior of strained apricots thickened with modified cassava starch was investigated using mixer viscometry techniques. Initially, the sample showed irreversible thixotropy, which was quantified by evaluating time-dependent torque decay. Mechanically degraded samples had time-independent properties and were evaluated as power-law fluids. Rheological techniques developed were successfully used to evaluate the textural shelf life of strained apricots thickened with different types of modified cassava starch (acetylated Di-starch phosphate and Di-starch phosphate, both commercially manufactured). (AS)

I02 Uses, Industrialization, Processing and Storage

158

26161 AGRO INDUSTRIAL Novo Tres Passos Ltda. (The Novo Tres Passos Ltda agroindustrial complex). Marechal Candido Rondon-PA, Brasil. 4p. Port., Illus.

Cassava. Cassava starch. Industrial starches. Industrial machinery. Brazil.

The largest and most modern cassava starch agroindustrial complex in Brazil, Novo Tres Passos, is briefly described. Products produced include export-type starch, starch for the food industry, modified starches, and adhesives. (CIAT)

159

26314 ALONSO, L. ; BEST, R.; ORTEGA, J. 1986. Evaluación de un secador de capa fija acoplado a un colector solar plano. (Evaluation of a fixed layer dryer coupled to a flat solar collector). In Best, R.; Ospina P., B., comp. El desarrollo agro-industrial del cultivo de la yuca en la Costa Atlántica de Colombia. Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de secado natural de yuca período julio 1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. v.2,pp.72-77. Span., [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Mechanization. Drying. Dried roots. Cassava chips. Temperature. Costs. Developmental research. Colombia.

A fixed layer dryer coupled to a flat solar collector was evaluated when combined with natural drying of cassava on concrete floors in Betulia (Sucre, Colombia) to find a way to reduce the operating expenses of the combined drying system. The use of the combined drying system of cassava chips was not more economical than the natural drying system used alone, since the low increase in air temp. (plus or minus 4 degrees Celsius) demands a high air flow to dry the fresh chips; this requires a large investment in equipment (motor and fan). To have a year-round production of dry cassava, artificial systems to heat the drying air will be required. (CIAT)

160

25800 BARAJAS F., C. ; ESCALANTE H., H.; FLOREZ A., J.A. 1982. Obtención del extracto enzimático de la yuca para la producción de alcohol por hidrólisis. (Production of the enzymatic extract from cassava to obtain alcohol by hydrolysis). Tesis Ing. Químico. Bucaramanga, Colombia. Universidad Industrial de Santander. 128p. Span., 50 Refs., Illus.

Cassava. Enzymes. Hydrolysis. Alcohol. Leaves. Stems. Roots. Temperature. Starch productivity. Storage. Colombia.

The exptl. procedures to produce an unpurified enzymatic extract from cassava to obtain alcohol through starch hydrolysis are presented. Enzymes were obtained using cassava roots, leaves, or stems, but their purification is recommended since the activity of the unpurified extract is low. The use of cassava leaves as source is recommended since their protein content is higher. The best method for amylase extraction was that of calcium acetate at 0.2 percent. The optimal conditions for the unpurified leaf extract were: ratio of leaf wt.:vol. extractor solution, 1:3; extraction time, 3 h; incubation time, 10 min; pH, 6.7; temp., 37 degrees Celsius. A 1:1 substrate-extract ratio (1 ml starch at 1 percent:1 ml leaf extract) was selected, yielding 18.5 percent. (CIAT)

161

26306 BEST, R. ; OSPINA P., B., comp 1986. El desarrollo agro-industrial

del cultivo de la yuca en la Costa Atlántica de Colombia. (The agroindustrial development of cassava on the Colombian Atlantic Coast). Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de secado natural de yuca período julio 1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT, v.2,103p. Span., Sum. Span., 4 Refs., Illus.

Cassava. Cassava programs. Factories. Drying. Dried roots. Processed products. Cultivars. Marketing. Labor. Costs. Root productivity. Storage. Cuttings. Cassava products. Feeds and feeding. Socioeconomic aspects. Statistical data. Developmental research. Colombia.

The activities conducted in 1984/85 by the Integrated Rural Development Program (DRI)/CIAT collaborative project on the agroindustrial development of cassava on the Colombian Atlantic Coast are reported. Studies were conducted on costs and benefits of the establishment of the cassava natural drying plants, the availability of land and labor to extend cassava cultivation in the region, and cassava marketing at the regional and national levels. Regional and agronomic trials and artificial drying tests were also conducted. The total no. of beneficiaries of the 20 cassava drying plants was 1158 members and nonmembers. The annual demand for dried cassava by the animal feed industry is estimated to be 140,000 t if its price is 78 percent that of sorghum. On the other hand, clones CM 681-2, M Col 1505, and Venezolana have shown a stable performance over a range of agroecological conditions. Cassava planting material can be stored for up to 85 days without affecting yields. In trials carried out to determine the optimum cassava/maize intercropping system, it was concluded that it depends on relative prices, quality requirements, and agroclimatic conditions. The final evaluations of a fixed layer dryer coupled to a flat solar collector indicated that a high cost of investment in equipment is required to move the necessary air. Promising exptl. results have been obtained at CIAT with a fixed layer dryer that uses carbon as the source of energy. Individual papers are found in this publication under the following consecutive no.: 048 106 159 174 (CIAT)

162

26150 BEST, R. ; ALONSO, L. 1984. Evaluación de un secador de capa fija acoplado a un colector solar plano. (Evaluation of a fixed layer dryer coupled to a flat solar collector). In _____., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer Informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.89-103. Span., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Drying. Industrial machinery. Solar drying. Cassava chips. Development costs. Costs. Labor. Developmental research. Cassava programs. Colombia.

The components and operation of a fixed layer cassava dryer coupled to a flat solar collector are described, and the results obtained when using this dryer in cassava drying trials are presented. The dryer operates from 07:00 to 19:00 h, with a flow of 106 cubic meters/min. The solar collector increases the av. air temp. from 30.7 to 35.7 degrees Celsius, thus lowering the RH from 61.8 to 46.0 percent. The load for the dryer is estimated to be 150 kg/square meter during an av. 24-h period. Based on the results obtained, it was estimated that to establish a combined natural/artificial drying system, a drying floor area of 200 square meters requires a fixed layer dryer of 6 square meters. Investment and operating costs are presented. (CIAT)

163

23167 BEST, R. 1983. Observaciones preliminares para el desarrollo de la tecnología apropiada para secado artificial y combinación con el secado natural. (Preliminary observations for the development of appropriate technology for artificial drying of cassava and its combination with natural drying). In Gómez, G., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Segundo informe julio 1982-mayo 1983. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI/ACDI-CIAT. pp.45-47. Span., [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Developmental research. Drying. Solar drying. Temperature. Mechanization. Technology evaluation. Colombia.

The advances achieved by CIAT regarding the development of appropriate technology to hasten the drying process of cassava and to increase the capacity of drying plants on the Colombian Atlantic Coast are reported. To date, artificial drying (static beds) trials, conducted at CIAT, have concentrated on evaluating drying with and without a solar collector. The drying air conditions are improved with the use of the solar collector since the av. air temp. increases 5 degrees Celsius and RH decreases from 74 to 62 percent; the max. load of cassava chips that can be dried in 48 h is 125 kg/square meter vs. 75 kg/square meter without a solar collector. In Betulia (Sucre), the possibility of combining natural and artificial drying is being studied. Preliminary results indicate that it is necessary to assure that cassava chip MC is less than 50 percent, indicating that the max. load of cassava chips on drying floors should be 10-12 kg/square meter during the summer and 6-8 kg/square meter during the rainy season. If an MC less than 50 percent is achieved the 1st day of natural drying, subsequent artificial drying will take 24 h to reduce MC to less than 14 percent. Studies are being conducted to develop static bed dryers with charcoal burners or heat exchangers. (CIAT)

164

26364 CEARA MAQUINAS AGRICOLAS S.A.. Raspadeira de mandioca CEMAG. (CEMAG cassava chipper). Fortaleza-CE, Brasil. 2p. Port., Illus.

Cassava. Cassava chips. Small-scale equipment. Dried roots. Brazil.

The technical characteristics and advantages of the CEMAG cassava chipper are briefly described. The machine yields 2000 kg cassava chips/h. (CIAT)

165

26738 CENTRO DE DESARROLLO INDUSTRIAL DEL ECUADOR. 1976. Almidón de yuca. (Cassava starch). Guayaquil. 40p. Span., Sum. Span., Illus.

Cassava. Cassava starch. Cassava programs. Economics. Industrialization. Developmental research. Development costs. Costs. Ecuador.

A project of the Centro de Desarrollo Industrial del Ecuador (1967) for the construction in this country of an industrial plant for the manufacture of prime quality (international standard) cassava starch is presented. The advantages of the project are discussed, as well as the industrial protection rights that would cover it, its location (in the provinces of Manabí, Pichincha, or Los Ríos), its capacity (5376 MT cassava starch and 2682 MT cassava pulp, using 24,000 MT fresh roots as raw material), investment, profitability and point of economic equilibrium (which is reached with 31 percent of total sales). Several aspects of starch marketing (quality specifications, uses, and by-products), supply and demand, and prices are discussed. The major starch demand is for textile and cardboard factories (1529 and 3272 t, resp., projected for 1973). The expected demand for glucose manufacture is also important: 1315 t in 1973.

Supply is estimated to be approx. 400 MT/yr at the industrial level. Technical data are included on production, supply of raw materials, and process description, as well as general data on cassava cultivation. (CIAT)

166

26775 CENTRO DE DESARROLLO INDUSTRIAL DEL ECUADOR 1974. Harina de yuca. (Cassava flour). Guayaquil. 83p. Span., Sum. Span., 9 Refs., Illus.

Cassava. Cassava programs. Cassava flour. Economics. Developmental research . Costs. Marketing. Production. Statistical data. Peeling. Grinding. Fermentation. Pressing. Drying. Screening. Labor. Ecuador.

A project to produce CF as a substitute for 10 percent of the imported wheat flour for bakery purposes, carried out in Canton Ventanas (Los Rios, Ecuador), is analyzed from the technical and economic points of view; this represents a potential demand of over 10,000 t/yr. Data on the domestic production, imports and consumption of wheat flour, and demand and price projections of wheat and cassava flours are given. The production process of a plant with a processing capacity of 4500 t CF/yr (250 days) is briefly described. The economic analysis of the plant indicated an av. annual profitability of 23 percent. The project would generate 131 direct employments: 110 for agricultural tasks and 21 for industrial tasks. (CIAT)

167

26737 CENTRO DE DESARROLLO INDUSTRIAL DEL ECUADOR. 1976. Harina de yuca para panificación. (Cassava flour for bakery purposes). Guayaquil. 42p. Span., 7 Refs., Illus.

Cassava. Economics. Production. Industrialization. Costs. Labor. Cassava flour. Ecuador.

A project on CF production in NE Ecuador to substitute 10 percent of the imported wheat flour for bakery purposes was technically and economically analyzed. Data are presented on the national production, imports and consumption of wheat flour, and projections of the demand and prices of wheat and cassava flours. The CF production process is briefly described, referring to a plant with a processing capacity of 40 MT fresh cassava/day and a recovery of 30 percent CF and 2 percent cassava starch. A detailed economic analysis indicated that the plant will have an av. annual profitability of 28.45 percent over an 11-yr period. An economic analysis is also presented for CF production from harvest residues (cassava leaves and stems). (CIAT)

168

26776 CENTRO DE DESARROLLO INDUSTRIAL DEL ECUADOR. 1976. Pellets de yuca. (Cassava pellets). Guayaquil. 114p. Span., Sum. Span., 5 Refs., Illus.

Cassava. Pellets. Cassava programs. Industrialization. Prices. Marketing. Labor. Costs. Washing. Peeling. Drying. Grinding. Legal aspects. Ecuador.

A feasibility study for cassava pellet production in Canton de Ventanas (Los Rios, Ecuador) for exportation to animal feed industries abroad, especially the EEC, is presented. The production process is briefly described. The plant is projected to produce 12,000 MT pellets/yr (250 days), which will require 36,000 MT fresh cassava roots or, in other words, the production of 801 ha. The internal rates of return for 3 different CIF prices of pellets were estimated to be 16.9, 22.0, and 26.7 percent. The invested capital would be recovered in 13, 9, or 7 yr, resp. (CIAT)

169

23156 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1982. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos

departamentos de la Costa Norte de Colombia; producción y procesamiento de yuca en el Departamento de Sucre: primer informe noviembre 1981-junio 1982. (Pilot plan for agro-industrial development of cassava in some departments on the northern coast of Colombia; cassava production and processing in the department of Sucre: first report November 1981-June 1982). Cali, Colombia, Proyecto Cooperativo DRI/ACDI-CIAT. 50p. Span., Sum. Span., Illus.

Cassava. Factories. Drying. Costs. Cassava programs. Root productivity. Marketing. Production. Cultivars. Developmental research. Labor. Colombia.

The activities and advances up to June 1982 of a project to demonstrate the economic and technical feasibility of the natural drying of cassava and its processing into animal feed, through the operation of a pilot plant in Betulia (Sucre, Colombia), are reported. The elaboration of animal feeds, based on cassava, appears to be an economically and technically feasible activity under the production and marketing conditions of the Atlantic Coast. According to the results, natural drying plants of cassava, with drying floor areas between 500-1000 square meters, are profitable. Markets for human consumption pay higher prices for the product but are limited. The increasing demand for balanced feeds will require an increase in the local production of sorghum or maize or in imports, or the substitution of these cereal grains for CF, which can be produced locally. An important aspect of the project has been the direct participation of farmers in the operation of the pilot plant and in the marketing of both fresh roots and the dry product. (CIAT)

170

26847 CHACON M., M. 1983. Sustitución parcial de harina de trigo utilizando harina de arroz, banano, soya y yuca. Caracterización de sus propiedades y posible utilización en galletería comercial. (Partial substitution of wheat flour using rice, banana, soybean, and cassava flours. Characterization of their properties and potential use in commercial biscuit-making). Tesis Lic. Tecnología. San José, Universidad de Costa Rica. 153p. Span., Sum. Span., 71 Refs., Illus.

Cassava. Cassava flour. Processed products. Bakery products. Composite flours. Composition. Organoleptic examination. Costa Rica.

The use of rice, banana, soybean, and cassava (7.4 percent MC, 6.3 pH, 0.3 cm expansion) flours as partial substitutes for wheat flour in the preparation of a commercial-type biscuit manufactured in a rotary engine, in Costa Rica, was studied. For each flour type, 5-50 percent substitution levels were used. Standard flour was used for comparative purposes. The rheological performance of the most suitable mixes was analyzed and a sensory evaluation test was carried out. The highest levels of substitution obtained were 10 percent for soybean flour and 15 percent for rice and cassava flours. For 15 percent CF, gelatinization temp. and viscosity were 80 degrees Celsius and 425 Brabender units, resp. Except banana flour, all substitutes used in the right percentages improved biscuit organoleptic properties. (AS-CIAT)

171

26872 COURSEY, D.O. ; MARRIOTT, J.; McFARLANE, J.A.; TRIM, D.S. 1982. Improvements in field handling, chipping and drying of cassava. Journal of Root Crops 8(1-2):1-15. Engl., 47 Refs., Illus. [Tropical Products Inst., 56/62, Gray's Inn Road, London, England]

Cassava. Cassava roots. Fresh products. Postharvest technology. Postharvest losses. Deterioration. Storage. Timing. Drying. Solar drying. Temperature. Factories. Pellets. Insect control. Insecticides. Thailand.

The following aspects of cassava handling and processing are reviewed (1) handling of fresh cassava roots, with discussions of the causes of

postharvest deterioration, reduction of water loss during handling, preharvest techniques for reducing the susceptibility to postharvest deterioration, reduction of mechanical injuries, and integrated handling systems; (2) processing; (3) chipping and drying (sun drying, artificial drying, palletizing); and (4) handling of dried cassava products (general problems, storage of pellets, insect infestation of dried cassava, and insect control measures). (Food Science and Technology Abstracts)

172

26721 DIAMANTE, J.C. ; DATA, E.S. 1985. Technoguide on root soy sauce. Baybay, Leyte, Philippine Root Crop Research and Training Center, Visayas State College of Agriculture. 11p. Engl., Illus. [Postharvest Technology Section, Philippine Root Crop Research & Training Center, Visayas State College of Agriculture, Baybay, Leyte, Philippines]

Cassava. Cassava programs. Developmental research. Production. Industrial machinery. Cassava chips. Washing. Peeling. Drying. Grinding. Fermentation. Philippines.

A practical guide for the small-scale production of soy sauce based on cassava or sweet potatoes is presented. The processing of cassava roots, which includes washing, peeling, chipping, drying, grinding, and roasting, is described. The rest of the process for soy sauce production is explained. (CIAT)

173

26837 EZEALA, D.O. 1984. Effect of fermentation on the fatty acid content and composition of cassava tuber meal. Journal of Food Biochemistry 9(3):249-254. Engl., Sum. Engl., 18 Refs. [Faculty of Biological Sciences, Univ. of Port Harcourt, P.M.B. 5323, Port Harcourt, Nigeria]

Cassava. Cassava meal. Fermentation. Lipids. Composition. Fat content. Nigeria.

The effect of fermentation on the fatty acids content and composition of CM was studied. Oleic and palmitic acids were the major fatty acids of the CM lipid. Other fatty acids found, in decreasing order, were linoleic, linolenic, palmitoleic, stearic, myristic, pentadecanoic, heptadecanoic, and nonadecanoic acids. CM fermentation resulted in substantial increases in the absolute quantities of the individual fatty acids detected, except linolenic acid. Fermentation, however, did not alter the pattern of composition of the fatty acids, but caused increases in the composition of saturated fatty acids and decreases in certain unsaturated ones. Stearic acid increased in composition by about 92.6 percent and pentadecanoic by about 50.0 percent. Reductions of about 72.0 percent of the linolenic acid and 24.2 percent of the palmitoleic acid were obtained in the fermented CM lipid. (AS)

174

26315 FIGUEROA, F. ; ALONSO, L.; VIERA, M.A. 1986. Evaluación de un secador artificial de capa fija utilizando carbón como fuente de energía. (Evaluation of a fixed layer artificial dryer using carbon as energy source). In Best, R.; Ospina P., B., comp. El desarrollo agro-industrial del cultivo de la yuca en la Costa Atlántica de Colombia. Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de secado natural de yuca período julio 1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. v.2,pp.78-89. Span., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Industrial machinery. Drying. Dried roots. Cassava chips. Temperature. Costs. Power sources. Developmental research. Colombia.

A fixed layer artificial cassava dryer that uses carbon as the source of energy to heat the air is described and results of expt. carried out with Brazilian-, Malaysian-, and Thai-type cassava chips are given. The carbon burner increases the drying air temp. to 60 degrees Celsius at an air flow of 36 cubic meters/min. Using air flows of 120-130 cubic meters/min/t fresh cassava at 60 degrees Celsius, chip MC can be reduced to 12.3 percent over an av. of 9 continuous h; the system requires 370 kg carbon to obtain 1 t dried cassava, operating at a global thermal efficiency of 43 percent. The system seems to be promising for drying cassava and will be evaluated at the pilot plant level. Investment costs and recommendations on operation are presented; diagrams on the drying system are included. (CIAT)

175

23161 GOMEZ, G. 1983. Expansión del proyecto cooperativo DRI/ACDI-CIAT en los departamentos de Atlántico, Córdoba, Magdalena y Sucre. (Expansion of the collaborative project DRI/CIDA-CIAT to the Atlántico, Córdoba, Magdalena, and Sucre departments). In _____., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Segundo informe julio 1982-mayo 1983. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI/ACDI-CIAT. pp.5-9. Span., [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Drying. Cassava programs. Developmental research. Socioeconomic aspects. Colombia.

An interinstitutional commission (Integrated Rural Development program-DRI, Canadian International Development Agency, CIAT) investigated the feasibility of initiating cassava drying plants (similar to the Betulia pilot plant in Sucre) elsewhere on the Colombian Atlantic Coast. The commission surveyed different locations, based on the following criteria: (1) farmers' organizations, (2) technical assistance provided by DRI, and (3) cassava potential. The building of 6 additional plants (1 in Córdoba, 2 in Sucre, 1 in Atlántico, and 2 in Magdalena) and the increase of the drying area of the Betulia pilot plant from 300 to 1000 square meters were approved. Recommendations should be made to correct possible deficiencies. (CIAT)

176

23168 GOMEZ, G. ; OSPINA, B. 1983. Otras actividades. (Complementary activities). In _____., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Segundo informe julio 1982-mayo 1983. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI/ACDI-CIAT. pp.48-50. Span., [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Developmental research. Drying. Agricultural equipment. Technology evaluation. Colombia.

The following complementary activities for the cassava drying processes evaluated by the collaborative project Integrated Rural Development program/Canadian International Development Agency/CIAT are described: (1) use of concrete-soil mixtures for the drying surfaces; although a 1:8 concrete:soil mixture was recommended, it was not possible to implement this recommendation at the pilot plant level; (2) publication of a technical bulletin; and (3) development of a mechanical furrow-opener for cassava, which is initially being used at Instituto Colombiano Agropecuario-Sucre. (CIAT)

177

23160 GOMEZ, G. 1983. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la costa Atlántica de

Colombia. (Pilot plan for the agroindustrial development of cassava in some departments of the Colombian Atlantic Coast). Segundo informe julio 1982-mayo 1983. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI/ACDI-CIAT. 55p. Span., Sum. Span., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Drying. Developmental research. Economics. Production. Marketing. Intercropping. Cultivars. Root productivity. Technology evaluation. Industrialization. Socioeconomic aspects. Colombia.

Activities of the collaborative project Integrated Rural Development program (DRI)/Canadian International Development Agency-CIAT for the agroindustrial development of cassava on the Colombian Atlantic Coast are reported for the period July 1982-May 1983. Efforts concentrated on the expansion of the drying areas of the Betulia pilot plant in Sucre from 300 to 1000 square meters and the construction of 6 additional plants (2 in Sucre, 1 in Córdoba, 1 in Atlántico, and 2 in Magdalena). Economic data are presented regarding updated investments and returns to operate cassava drying plants with drying areas of 500 and 1000 square meters. Partial results of a survey of cassava production and marketing in the region are given. Collaborative agronomic research was conducted at different sites to compare the productivity of cassava var. Venezolana, M Col 1684, and the hybrid CM 342-170 in monoculture and in association with maize and yams; M Col 1684 was superior in both cropping systems, but the productivity of the local var. Venezolana could probably be increased with improved technology. Training activities are reported as well as preliminary observations on the development of appropriate technology for artificial cassava drying and its combination with natural drying. Individual papers are found in this publication under the following consecutive no.: 163 175 176 184 (CIAT)

178

26854 MAEDA, E.E. 1985. Effect of solar dehydration on amino acid pattern and available lysine content in four tropical leafy vegetables. Ecology of Food and Nutrition 16(3):273-279. Engl., Sum. Engl., 26 Refs. [Faculty of Agriculture, Forestry & Veterinary Science, Univ. of Dar es Salaam, Morogoro, Tanzania]

Cassava. Solar drying. Leaves. Protein content. Amino acids. Tanzania.

When fresh tropical leafy vegetables (Amaranthus sp., cowpea, sweet potato, cassava) were sun-dried, there were increases in aspartic acid, glutamic acid, valine, leucine, and isoleucine content and decreases in lysine and histidine, indicating complex interactions involving the N-bearing compounds, particularly the amino acids. Dried Amaranthus leaves were rich in all the essential amino acids. Dried Amaranthus leaves were rich in all the essential amino acids. Dried cowpea, cassava, and sweet potato leaves were also rich in essential amino acids, except the S amino acids. (AS)

179

26742 McFARLANE, J.A. 1982. Cassava storage. 2. Storage of dried cassava products. Tropical Science 24(4):205-236. Engl., Sum. Engl., Fr., Span., 110 Refs. [Storage Dept., Tropical Products Inst., London Road, Slough SL3 7HL, England]

Cassava. Storage. Postharvest losses. Processed products. Dried roots. Cassava chips. Insect control. Diseases and pathogens. Cassava flour. Pellets. HCN. Mycoses. Aspergillus flavus. Aflatoxins. Industrial starches. Cassava meal. Tapiocas. Gari. United Kingdom.

Existing information on the storage of dried cassava products, such as chips, flour, and pellets, the dried fermented products gari and farinha da manioca, and also cassava starch and its products, is reviewed. The correct drying of cassava products is stressed due to its importance in subsequent

storage behavior. The microbial attack and insect infestation of dried cassava are also discussed. (CIAT)

180

26137 MOORTHY S.N. 1983. Effect of some physical and chemical treatments on cassava flour quality. Journal of Food Science and Technology 20:302-305 . Engl., Sum. Engl., 18 Refs. [Division of Technology, Central Tuber Crops Research Inst., Trivandrum 695 017, India]

Cassava. Cassava flour. Processed products. Organoleptic examination. Timing. Puttu. Cassava starch. India.

CF was subjected to treatments like oxidation, acid and base treatments, low levels of derivatization, mild fermentation, and autoclaving to reduce stickiness and improve the organoleptic quality. It was found that orthophosphoric acid treatment and conversion to succinic ester derivative improved the quality, but the latter imparted a slight bitter taste to the product; therefore only orthophosphoric acid treatment was found suitable. (AS)

181

26747 MOREIRA, J.R. ; VANIN, V.R.; GOLDEMBERG, J.; SERRA, O.E. 1979. Energy balance for the production of ethyl and methyl alcohol. Sao Paulo, Brasil, Instituto de Física. Universidade de Sao Paulo. 43p. Paper presented at Workshop on Fermentation Alcohol for Use as Fuel and Chemical Feedstock in Developing Countries, Vienna, Austria, 1979. Engl., Sum. Engl., 29 Refs., Illus.

Cassava. Alcohol. Ethanol. Energy productivity. Costs. Power sources. Industrial machinery. Waste utilization. Labor. Brazil.

Energy requirements to produce ethyl and methyl alcohol from 5 different crops (sugarcane, cassava, sweet sorghum, eucalyptus, and Pinus) were calculated considering different processing systems: (a) transformation of fermentable and/or unfermentable sugars into ethanol and (b) transformation of cellulosic materials into methanol. Whenever possible, the energy coefficients evaluated from Brazilian input-output matrix were used. Figures are presented for the energy consumption in the agricultural phase and for the energy consumed as fuel in the industrial phase. Cassava produced 2523 liters alcohol/ha/yr in system (a) and 2963 liters alcohol/ha/yr in systems (a) + (b). Energy consumption during the agricultural phase was 2431 Mcal/ha/yr for both systems, and during the industrial phase, 12,301 and 15,205 Mcal/ha/yr, resp. (AS (extract))

182

26870 OGUNSUA, A.O. 1985. Changes in lipids during fermentation of cassava flour. Journal of Food Biochemistry 9(3):255-262. Engl., Sum. Engl., 14 Refs. [Dept. of Food Science & Technology, Univ. of Ife, Ile-Ife, Nigeria]

Cassava. Cassava flour. Lipids. Fermentation. Cassava chips. Laboratory experiments. Sugar content. Composition. Enzymes. Carbohydrate content. Nigeria.

During the incubation of CF with or without yeast, lipids increased with the mobility of diglyceride. Glycolipids were metabolized during the fermentation as evidenced by 17 percent less hexose in the lipids. Linolenic acid fell from 11 percent in unincubated flour to 7 percent in the fermented flour. Palmitoleic acid, a major yeast fatty acid, was absent in the fermented product. (AS)

183

26151 OSPINA P., B. 1984. Proyecciones para la campaña 1984/85. (Projections for 1984-85). In Best, R., ed. Plan piloto para el desarrollo

agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.104-111. Span., [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Developmental research. Drying. Production. Marketing. Consumption. Costs. Statistical data. Colombia.

The projections of the dried cassava project on the Colombian Atlantic Coast for 1984-85 are discussed. The installed capacity of the present cassava drying plants will be increased from 7180 square meters in June 1984 to 9100 square meters in 1985. Ten new plants will be established, based on an evaluation of selected criteria: 3 in Córdoba, 2 in Sucre, 1 in Bolívar, 2 in Atlántico, 1 in Magdalena, and 1 in Cesar. As of Dec. 1984, the installed capacity will be 14,000 square meters of drying floor, with a total production of 3500 t dry cassava/yr. (CIAT)

184

23162 OSPINA P., B. 1983. Replicación de las plantas de secado en la Costa Atlántica. (Replication of cassava drying plants on the Atlantic Coast). In Gómez, G., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Segundo informe julio 1982-mayo 1983. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI/ACDI-CIAT. pp.10-16. Span., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Drying. Industrialization. Costs. Development costs. Socioeconomic aspects. Developmental research. Legal aspects. Colombia.

The technical details of the investments made in 6 new cassava drying plants and in the expansion of the drying floor area of the Betulia pilot plant in Sucre are given. Of the new plants, 2 were built in Sucre, 1 in Córdoba, 1 in Atlántico, and 2 in Magdalena. At least 250 ha planted to cassava, with an av. yield of 10 t/ha, will be required to operate all 7 plants at full capacity. (CIAT)

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Afr.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
AMV	Alfalfa mosaic virus
approx.	Approximate(ly)
atm.	Atmosphere
ATP	Adenosine 5'-triphosphate
av.	Average
BAP	6-Benzylaminopurine
BBMV	Broad bean mosaic virus
BCMV	Bean common mosaic virus
BGMV	Bean golden mosaic virus
BGYMV	Bean golden yellow mosaic virus
BOD	Biochemical oxigen demand
BPMV	Bean pod mottle virus
BRMV	Bean rugose mosaic virus
BSMV	Bean southern mosaic virus
BV	Biological value
BYMV	Bean yellow mosaic virus
°C	Degrees Celsius (centigrade)
ca.	About (circa)
CAMD	Cassava African mosaic disease
CMV	Cassava African mosaic virus
CBB	Cassava bacterial blight
CBSD	Cassava brown streak disease
CEC	Cation exchange capacity
CER	CO2 exchange rate
CF	Cassava flour
CGR	Crop growth rate
CLM	Cassava leaf meal
CLV	Cassava latent virus
CM	Cassava meal
cm	Centimeter(s)
COD	Chemical oxigen demand
concn.	Concentration
CP	Crude protein
CSL	Calcium stearyl lactylate
CSW	Cassava starch wastes
C.V.	Coefficient of variation
cv.	Cultivar(s)
2,4-D	2,4-dichlorophenoxyacetic acid
DM	Dry matter
DNA	Deoxyribonucleic acid
EC	Emulsifiable concentrate
EDTA	Ethylenediaminetetraacetic acid
EEC	European Economic Community
e.g.	For example
ELISA	Enzyme-linked immunosorbent assays
EMS	Ethyl methane sulfonate
Engl.	English
EP	Preliminary Trials, CIAT
expt.	Experiment(s)
exptl.	Experimental
°F	Degrees Fahrenheit
Fr.	French
ft-ca	Foot candles (10.76 lux)
FYM	Farmyard manure
g	Gram(s)
G	Giga (10⁹)
GA	Gibberellic acid
gal	Gallon(s)
GE	Gross energy
Germ.	German
GERs	Glucose entry rates
GLC	Gas-liquid chromatography
h	Hour(s)
ha	Hectare(s)
HCN	Hydrocyanic acid
HDP	Hydroxypropyl distarch phosphate (modified cassava starch)
HI	Harvest index
hp	Horsepower
IAA	Indoleacetic acid
IBA	Indolebutyric acid
IBYAN	International Bean Yield and Adaptation Nursery, CIAT
Illus.	Illustrated
in.	Inches
Ital.	Italian
IU	International unit
J	Joule
Jap.	Japanese
kat	Katal(amount of enzymatic activity that converts 1 mole of substrate/s)
kcal	Kilocalorie(s)
kg	Kilogram(s)
kJ	Kilojoule
km	Kilometer(s)
KNap	Potassium naphthenate
kR	Kiloroentgen(s)
l	Liter(s)
LAD	Leaf area duration
LAI	Leaf area index
lat.	Latitude
lb	Pound(s)
LD50	Mean lethal dose
LER	Land efficiency ratio

LPC	Leaf protein concentrate
lx	Lux
M	Mega
M	Molar
m	Meter(s)
Mal.	Malay
max.	Maximum
MC	Moisture content
ME	Metabolizable energy
meq	Milliequivalent(s)
met.	Methionine
mg	Milligram(s)
mho	Reciprocal ohm
min.	Minimum
min	Minute(s)
ml	Milliliter(s)
mm	Millimeter(s)
mo.	Month
mol. wt.	Molecular weight
m.p.	Melting point
NAA	Alpha-naphthalene acetic acid
NAD	Nicotinamide adenine dinucleotide
NADH	Nicotinamide adenine dinucleotide, reduced form
NAR	Net assimilation rate
NCE	Net CO2 exchange
NE	Northeast
NER	Net energy ratio
nm	Nanometer(s) (10-9 m)
no.	Number(s)
NPFs	Negative production factors
NPR	Net protein ratio
NPU	Net protein utilization
NW	Northwest
OM	Organic matter
oz	Ounce(s)
p.	Page
P	Probability
Pa	Pascal(s)
PAN	Peroxyacetic nitrate
PCNB	Pentachloronitrobenzene
PDA	Potato dextrose agar
PER	Protein efficiency ratio
pH	Hydrogen ion concentration
pp.	Pages
pphm	Parts per hundred million
PPI	Pre planting incorporation
ppm	Parts per million
PSA	Potato sucrose agar
pv.	Pathovar
Ref(s).	Reference(s)
resp.	Respective(ly)
Rf	Retardation factor-chromatography
RGR	Relative growth rate
RH	Relative humidity
RNA	Ribonucleic acid
Rom.	Romanian
rpm	Revolutions per minute
Russ.	Russian
s	Second
SBM	Soybean meal
SCN	Thiocyanate
SCP	Single cell protein
SDS	Sodium dodecyl sulfate
Sk.	Slovak
sp.	Species
Span.	Spanish
spp.	Species
SSL	Sodium stearyl-2-lactylate
Sum.	Summary
t	Ton(s)
TDN	Total digestible nutrients
temp.	Temperature
TIA	Trypsin inhibitor activity
TIBA	2,3,5-Triiodobenzoic acid compound with N-methylmethanamine
TLC	Thin-layer chromatography
TMV	Tobacco mosaic virus
TSH	Thyroid-stimulating hormone
UDPG	Uridine diphosphate glucose
UMS	Unmodified cassava starch
UV	Ultraviolet
var.	Variety(ies), varietal
VEF	Bean Team Nursery, CIAT
VFA	Volatile fatty acids
vol.	Volume
VPD	Vapor pressure deficit
vpm	Volume per million
vs.	Versus
W	West, watt
wk.	Week
WP	Wettable powder
wt.	Weight
yr	Year(s)
/	Per
%	Percent(age)
>	More than, greater than
<	Less than
≤	Equal to or less than
≥	Equal to or greater than
±	Plus or minus

Author Index

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Information and conclusions reported herein do not necessarily reflect the position of any of the aforementioned entities.

Abstracts on Cassava

(Manihot esculenta Crantz)

Vol. XIII **No. 2** **August, 1987**

CONTENTS

INTRODUCTION

This journal of analytical abstracts, which replaces the former combination of abstract cards and yearly cumulative volumes, is designed to provide a specialized guide to the world's literature on cassava (*Manihot esculenta* Crantz), disseminating research results and ongoing activities related to the crop.

The abstracts report condensed information from journal articles, booklets, mimeographed reports, theses, manuals and other conventional and nonconventional material, categorized into broad disciplinary fields to facilitate rapid scanning. Additionally, abstracts are author and subject indexed to enable more comprehensive consultation.

When retrospective or exhaustive coverage of a topic is desired, mechanized bibliographic searches of the entire document collection can be provided by CIAT's Documentation Center. Abstracts of all articles that match the topic of interest are provided to users who request this search service. The full text of every article abstracted by the Documentation Center is also available, through the photocopy service.

CIAT's Documentation Center also publishes journals of analytical abstracts on field beans (*Phaseolus vulgaris* L.) grown under tropical conditions and on tropical pastures. Other CIAT publications dedicated to keeping users aware of research developments in their respective fields include: Pages of Contents, Cassava Newsletter, Pastos Tropicales - Boletín Informativo, and Hojas de Fríjol.

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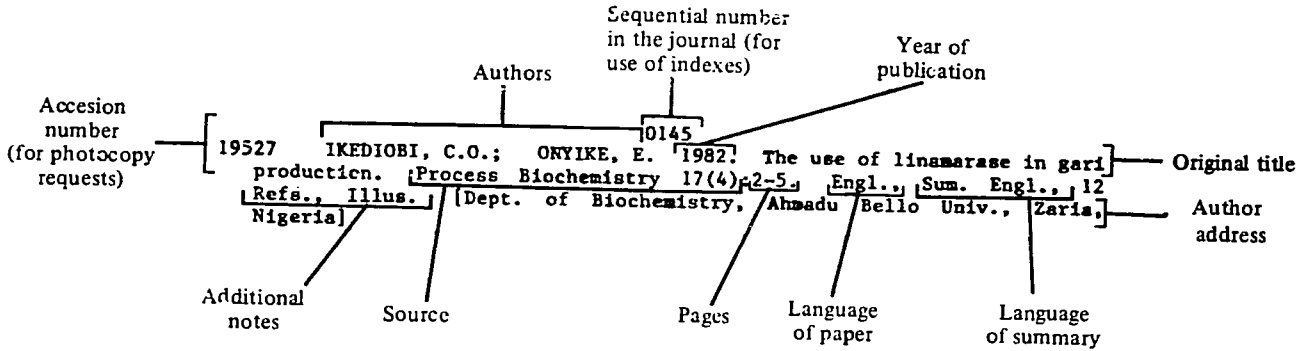

Cassava. Linamarase. Uses. Gari. Fermentation. Detoxification processes. Enzymes. Nigeria.

Keywords

The detoxification of cassava associated with fermentation depends on endogenous linamarase hydrolysis of the constituent cyanogenic glucosides. Addition of exogenous linamarase preparations to fermenting grated cassava not only increased the rate and extent of detoxification but also consistently yielded gari with innocuous levels of cyanide. A preliminary screening of several fungal isolates for their ability to synthesize linamarase, resulted in the identification of 2 fungi, Penicillium steckii and Aspergillus sydowi, capable of producing this enzyme in commercial quantities. The use of linamarase or linamarase-producing fungi in cassava fermentation for gari production may be an interesting possibility. [AS]

Abstract

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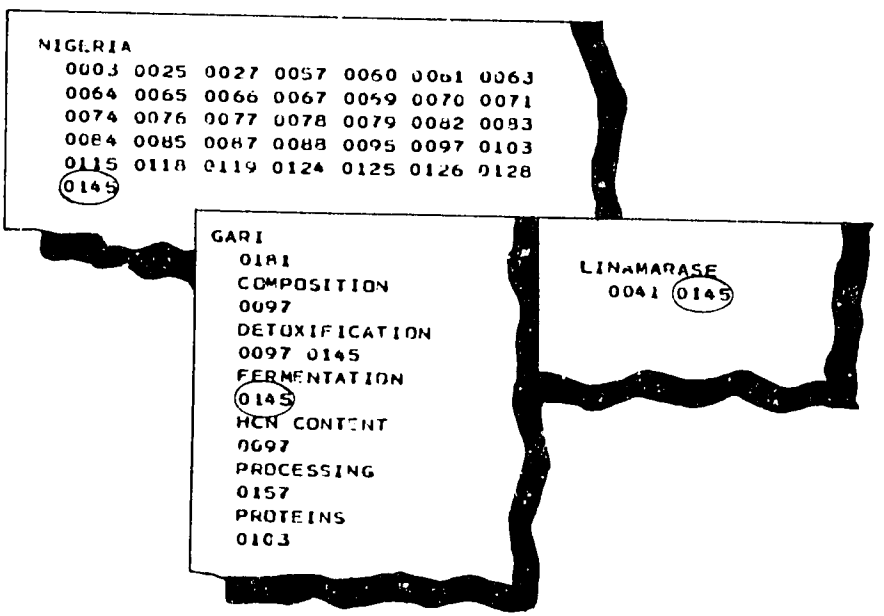
The Subject Index presents an alphabetical list of descriptors used in cassava research, many of which are combined with other descriptors, allowing the identification of more specific topics.



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A00 BOTANY, TAXONOMY AND GEOGRAPHICAL DISTRIBUTION

0185

28133 CARTER, S.E. 1986. A note on the distribution of cassava amongst different climate and soil types in South America. Cali, Colombia, Centro Internacional de Agricultura Tropical. Agro-Ecological Studies Unit. 17p. En., 6 Ref.

Cassava. Plant geography. Ecology. Climatic requirements. Soil requirements. South America. Colombia.

The distribution of cassava among different climate and soil types in South America, based on the adopted hierachical classification of soil and climate conditions for cassava, is briefly discussed. Both soil and climate components of the classification have been used to produce a map of environmental homologues for the crop. By subdividing cassava-growing areas on the basis of a simple climatic and edaphic classification, it is apparent that the ecosystems of CIAT's cassava program cover some important climate-soil homologues; if the system is to be continuously used, a more systematic approach towards soils is required and there are some important semiarid and highland areas that are not currently covered. It is recognized that the cassava program cannot work specifically for all the different classes identified, but the knowledge of their existence and relative importance can help the process of deciding where to work and how many different ecosystems to work for. The organization of data in a microregion framework is seen as a longer-term solution to climatic and edaphic classification problems that arise in the cassava program's research and planning. (CIAT)

C00 PLANT PHYSIOLOGY

0186

27631 NG, S.Y.C. 1985. Recommendations for handling tissue culture materials (sweet potato, yam and cassava). Ibadan, Nigeria, International Institute of Tropical Agriculture. Manual Series no.6. 13p. En., Il.

Cassava. Tissue culture. Plant reproduction. Nigeria.

A series of recommendations for handling tissue culture materials of sweet potato, yam, and cassava during transport and upon arrival are given. Factors affecting the survival rate are briefly discussed, namely the selection of the culture and pretreatment, the substrate used for transplanting, humidity control, temp., and watering. The procedures for transplanting the different tissue cultures are briefly described and illustrated. (CIAT)

0187

28128 PEREIRA, J.F.; SPLITTSTOESSER, W.E. 1986. A rapid method to estimate leaf area of cassava plants. HortScience 21(5):1218-1219. En., Sum. En., 8 Ref., Il. [Plant Physiology Laboratory, Univ. de Oriente, Jusepín, Monagas, Venezuela]

Cassava. Leaf area. Analysis. Cultivars. Venezuela.

A rapid method to determine the total leaf area of a cassava plant was identified. A ruler was designed to determine individual leaf area when the linear equation relating leaf area and the length of the middle leaf lobe is known. A linear equation can be developed for a specific cv. Total leaf area of a whole plant can be determined by counting the no. of phyllotactic

turns and using it in a linear equation relating cumulative leaf area with the no. of phyllotactic turns/plant. Equations for 6 cassava cv. (2062, 2078, 2106, 2112, 2191, and 2490) from the collection of the U. Central de Venezuela are given. (AS)

0188

27537 SALAZAR S., S. 1985. Cultivos de meristemas en cormos, raíces y tubérculos tropicales. (Primera parte). (Meristem culture of tropical corms, roots, and tubers (First part)). Actividades en Turrialba 13(1):6-7. Es., Sum. Es., fl.

Cassava. Apical meristems. Plant tissues. Culture media. Biotechnology. Costa Rica.

Preliminary results obtained with methods of culturing previously heat-treated apical meristems for the production of virus-free stocks of cassava, sweet potatoes, Xanthosoma sagittifolium, X. violaceum, Colocasia esculenta, and Dioscorea trifida are reported. Inorganic Murashige and Skoog's medium, supplemented with sugar and growth regulators (GA, NAA, benzyladenine, and N(6)-2 pentenyladenine), at different concn. (mg/liter) according to specie requirements, was used. (CIAT) See also 0214 0231 0384

C02 Cyanogenesis

0189

27687 IMOH, V.; WILSON, L.A.; FERGUSON, T.U. 1981. Comparison of crop performance in high yielding cassava cultivars. In University of the West Indies. Faculty of Agriculture. Annual Report 1978-81. St Augustine Trinidad, West Indies. p.91. En.

Cassava. Cultivars. Planting. Spacing. Growth. Leaf area. Timing. Trinidad and Tobago.

The effect of density on the growth of local cassava cv. Maracas Black Stick (MBS) and CIAT cv. M Col 22, both with high HI, was studied; 4 densities ranging from 7500 to 18,500 plants/ha were used. LAI, CGR, and tuber yield increased with density. Max. LAI (4.5 for MBS and 3.6 for M Col 22) occurred at 4 and 5 mo. after planting, resp., and coincided with peak CGR. Mean values of CGR and NAR over the growing period (44 wk.) also increased with density. Mean CGR was more variable in MBS (520-1116 kg/ha/wk.) than in M Col 22 (816-958 kg/ha/wk.) while a higher NAR was obtained in M Col 22 (1.76 gm/square decimeter/wk.) as compared with MBS (1.44 gm/square decimeter/wk.). NAR was negatively correlated (r = 0.65 at 1 percent) with LAI and surplus assimilate values at 8 and 20 wk. were found to be positively correlated (r = 0.856 at 0.1 percent) with yield at 44 wk. Tuber yields of 50-60 t/ha for M Col 22 and 32-45 t/ha for MBS were obtained. (Full text)

0190

27656 KRUTKUN, T. 1985. (Effect of addition of sulfuric acid solution into Map Bon sandy loam soil on growth of cassava). Kasetsart Journal 19(1):42-44. Thai., Sum. En., Thai., 7 Ref.

Cassava. Growth. Sulphuric acid. Thailand.

Addition of sulfuric acid solution to Map Bon sandy loam soil at a rate as high as 8 kg S/ha/wk. for 20 wk. (equivalent to 160 kg S/ha in 5 mo.) did not cause any damage to cassava. (AS)

C03 Chemical Composition, Methodology and Analyses

0191

27650 MONRO, J.A.; HOLLOWAY, W.D.; LEE, J. 1986. Elemental analysis of fruit and vegetables from Tonga. Journal of Food Science 51(2):522-523. En., Sum. En., 10 Ref. [Applied Biochemistry Division, Dept. of Science & Industrial Research, Private Bag, Palmerston North, New Zealand]

Cassava. Mineral content. Tonga.

Twelve foods from islands in the South Pacific Kingdom of Tonga were analyzed for 11 elements (Ca, K, Mg, P, S, B, Cu, Fe, Mn, Na, and Zn) by plasma emission spectrometry. The foods were green banana, ripe banana, breadfruit, cassava, coconut, mango, pawpaw, plantain, sweet potato, the taros Talo Fatuna and Talo Tonga, and Pacific yam. There were large differences between foods in their contents of Ca, Cu, Fe, Mn, and Na. Cassava showed values of 23.00, 344.00, 30.00, 47.00, 10.00, 0.30, 0.10, 0.31, 0.10, 10.50 and 0.77 mg Ca, K, Mg, P, S, B, Cu, Fe, Mn, Na, and Zn/100 g edible wt., resp. (AS) See also 0213 0223 0233

C04 Plant Nutrition

0192

27607 CARVALHO, P.C.L. DE 1985. Estudos sobre a afinidade entre fungos vesículo arbusculares e a mandioca, cultivar Cigana Preta. (Studies on affinity between vesicular-arbuscular fungi and cassava cultivar Cigana Preta). Revista Brasileira de Mandioca 3(2):83-89. Pt., Sum. Pt., En., 10 Ref., Il. [Empresa Brasileira de Pesquisa Agropecuária, Centro Nacional de Pesquisa de Mandioca e Fruticultura, Caixa Postal 007, 44.380 Cruz das Almas-BA, Brasil]

Cassava. Mycorrhizae. Nutrient uptake. P. K. Ca. Zn. Brazil.

The vesicular-arbuscular fungi Gigaspora margarita, G. heterogama, and Gigaspora sp. (native) were tested in the greenhouse for affinity to cassava cv. Cigana Preta, BGM 116. Each vesicular-arbuscular fungus was inoculated in sterilized and nonsterilized soil and the plants were grown for 4.5 mo. There was no difference in the efficiency of the 3 fungi. High levels of infection were observed in roots of plants grown on nonsterilized soil; DM yields were also low compared with those obtained on sterilized soil. Although no difference was observed in P, K, Ca, and Zn uptake by the mycorrhizal plants, greater amounts were absorbed by those grown on sterilized soil. (AS)

0193

27634 SCHENCK, N.C.; SPAIN, J.L.; SIEVERDING, E. 1986. A new sporocarpic species of Acaulospora (Endogonaceae). Mycotaxon 25(1):111-117. En., Sum. En., 2 Ref., Il. [Plant Pathology Dept., Univ. of Florida, Gainesville, FL 32611, USA]

Cassava. Mycorrhizae. Identification. Colombia.

A new species of Acaulospora, A. myriocarpa, a mycorrhizal-forming fungi, is described. This hyaline, small-spored species forms spores singly in soil and roots but also produces them in sporocarps and sporulates in soil crevices, within empty seed teguments, cast insect exoskeletons, and empty spores of other Endogonaceae. Spores are of similar size and appearance to those of A. trappei. Spores detached from the hyphal terminus can be confused possibly with Glomus occultum, G. diaphanum, and G. microcarpum.

The known distribution of A. myriocarpa is restricted to Colombia and Peru. It forms mycorrhizas with coffee, cassava, leeks, Pueraria phaseoloides, Brachiaria sp., and Stylosanthes sp. (AS)

0194

28117 SIEVERDING, E. 1984. Mykorrhizaforschung am Centro Internacional de Agrioultura Tropical - CIAT. (Mycorrhizal research at CIAT). Entwicklung und Landlicher Raum 18(6):30-32. De., 2 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Mycorrhizae. Nutrient uptake. P. Isolation. Colombia.

The nature of mycorrhizal associations and their functions are summarized and the need for research on mycorrhizal aspects of crop production is stressed. The results of research carried out at CIAT on the effects of cropping systems on the soil mycorrhizal population and the influence of inoculation on the symbiotic association with the crop are given. Ten fungal strains were isolated from 9 fields in Cauca, Colombia; the most abundant strains were Acaulospora sp. and Glomus fasciculatum, followed Acaulospora appendicula. The effect of 9 different isolates on growth, P uptake, and root length of cassava and their ability to compete with other soil microorganisms were studied in another expt. Glomus manihotis and A. appendicula were the most efficient mycorrhizal species for cassava. Entrophospora colombiana was very effective in increasing all plant growth parameters; however, it was unable to compete with the soil microflora. (CIAT)

D00 CULTIVATION

0195

27646 DIAS, C.A. DE C.; MARTINEZ, A.A. 1986. Mandioca: informacoes importantes. (Cassava: important information). Campinas-SP, Brasil, Coordenadoria de Assistencia Técnica Integral. Instrucao Prática no.190. 22p. Pt., Il.

Cassava. Cultivation. Insect control. Technological package. Brazil.

Simple general recommendations are given on different aspects of cassava production. Aspects dealt with are var. selection, soil preparation, selection of branches for planting, treatment of cuttings, liming and fertilization, planting method and distances, weed control, pruning, crop rotation, and harvesting. The main cassava pests (hornworm, shoot flies, stemborers) and diseases (CBB) and their control are briefly described. (CIAT)

0196

28324 FERGUSON, T.U. 1986. The cultivation of root and tuber crops in the Caribbean countries: report on the 1985 workshop of the Caribbean collaborative agricultural research network. In Regional Worksnop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.1-5. En., Sum. Es. [Univ. of the West Indies, St. Augustine, Trinidad and Tobago]

Cassava. Cultivation. Cassava programs. Caribbean.

In July 1985 representatives from 16 countries and institutions of the Caribbean region met in Guadeloupe to define common regional problems for the further development of root crops (including cassava) in the area, evaluate the potential for development of these crops, and develop a

program for regional network activities including research, exchange, training, and technology transfer. (CIAT) See also 0287 0300 0315 0317 0318 0319 0321 0326 0327 0332 0336 0340 0346 0362 0365 0376

D01 Soil, Water, Climate and Fertilization

0197

27613 DEFELIPO, B.V.; BRAGA, J.M.; AMARAL, F. DE A.L. DO; CAETANO, L.F. 1985. Adubacao NPK para a cultura de mandioca em um Latossolo Amarelo do Norte do Espírito Santo. (NPK fertilization of cassava in a yellow Latosol in northern Espírito Santo). Revista Brasileira de Mandioca 3(2):31-37. Pt., Sum. Pt., En., 17 Ref. [Depto de Solos, Univ. Federal de Vicosa, 36.570 Vicosa-MG, Brasil]

Cassava. N. P. K. Root productivity. Fertilizers. Economics. Brazil.

The effects of Araxá phosphate rock and rates of N, P, and K on cassava root yield were studied on a yellow Latosol in the state of Espírito Santo, Brazil. Soil was low in P (2 ppm) and high in K (100 ppm) and did not require liming. Four rates each of N (0, 40, 80, and 120 kg/ha), P (0, 50, 100, and 150 kg/ha), and K (0, 40, 80, and 120 kg/ha) were combined so that 12 treatments were obtained. These were applied in areas that had received 0, 1000, and 2000 kg Araxá phosphate rock. Urea, triple superphosphate, and potassium chloride were used as sources of N, P, and K, resp. P, K, and 1/4 of N were applied at planting and the remaining 3/4 of N were applied 30 days later. The criterion for fertilizer recommendation, adopted by the soil lab. of Minas Gerais and Espírito Santo, proved to be unreliable for K recommendations in cassava crops in the exptl. area. Responses to K application were obtained, although its level was considered high by these lab. The max. cassava root yield was obtained by applying 69.5 kg N, 124.9 kg P, and 91.1 kg K/ha. The economic rates of these elements were 61.0, 118.1, and 44.1 kg/ha, resp. (AS)

0198

27382 INSTITUT DE RECHERCHES AGRONOMIQUES TROPICALES ET DES CULTURES VIVRIERES. 1982. Mesure de l'erosion et du ruissellement d'un sol de la station IRAT de Cabassou. (Measure of soil erosion and runoff at IRAT-Cabassou station). In _____. Rapport des Activites en 1982. Guyane. Fiche d'Essai no.17. 18p. Fr.

Cassava. Erosion. Root productivity. Rainfall data. French Guiana.

Yield and production data are given for erosion control trials carried out on 6.0 and 11.5 percent slopes at the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres in Cabassou, French Guaiana, in 1982. Cassava cv. MU 20 root production (45 t/ha) decreased from the top to the base of the hills. Rainfall, runoff, and erosion data are given in table form.(CIAT)

0199

28132 JONES, P.O. 1986. Preliminary report on the possibilities for cassava drying technology for the Peruvian Selva. Cali, Colombia, Centro Internacional de Agricultura Tropical. Agro-Ecological Studies Unit. 13p. En., 10 Ref. 1 map included.

Cassava. Drying. Ecology. Climatic requirements. Soil requirements. Maps. Peru.

A preliminary description is made of the 6 zones the Peruvian jungle that could possibly be suitable for cassava production and application of drying technology. They are as follows: zone A, the valleys of the rivers

Chinchipe, Ulcabamba, and Upper Marañon; zone B, the valley of the Huallaga river from Juanju to Tarapoto and the valley of the Mayo river from Tarapoto to north of Moyobamba; zone C, Pucallpa and the valley of the Ucayali river; zone D, valley of the rivers Ene and Apurimac from Lusiana in the south to Puerto Prado in the north; zone E, areas to the north and east of Puerto Maldonado along the rivers Tacuatimanuo and Madre de Dios; zone F, the east-west arms of the valleys of the Yanatili Yavero and Alto Urumbaba. A map is is included. (CIAT)

0200

27614 KATO, M. DO S.A.; OLIVEIRA, R.P. DE; KATO, O.R. 1985. Comportamento de cultivares de mandioca em diferentes ambientes da Transamazonica. (Performance of cassava cultivars in different locations along the Transamazon highway). Revista Brasileira de Mandioca 3(2):39-45. Pt., Sum. Pt., En. [Empresa Brasileira de Pesquisa Agropecuária, Unidade de Execucao de Pesquisa de Ambito Estadual, Caixa Postal 061, 68.370 Altamira-PA, Brasil]

Cassava. Cultivars. Ecology. Adaptation. Root productivity. Foliage. Brazil.

A trial was carried out to study the adaptation of cassava cv. out in different locations along the Transamazon highway in Brazil: Altamira (1973-74 and 1974-75) on Terra Roxa Estruturada (Alfisol); Itaituba (1974-75) on red yellow Latosol (Ultisol); and Marabá (1977-78) on yellow Latosol (Ultisol). A randomized block design was used with 10 treatments and 4 replicates. Plants were spaced at 1.0 x 1.0 m in an area of 15 square meters. Marabà proved to be the most favorable location for root production and Itaituba for branch production. Location had a significant effect on root production for the cv. Lagoa, Engana Ladrao, Mameluca, Amazonas, and Pretinha. Variations in the environmental factors studied did not affect cv. IPEAN-12, Cachimbo, Riqueza, and Vassourinha Branca. (AS)

0201

26898 MONOMEROS COLOMBO VENEZOLANOS S.A.. 1984. Fertilización de la yuca. (Cassava fertilization). Fertilización de Cultivos en Clima Cálido no 1:95-101. Es., Il.

Cassava. Fertilizers. N. P. K. Ammonium sulphate. Maps Colombia.

A cassava fertilization plan using the fertilizer Nutrimon is proposed for warm regions of Colombia. Three fertilization regimes are given: (1) 8-30-12 or 13-26-6 (NPK) at 2-4 sacks of Nutrimon/ha at planting and 25-15-0 at 4-6 sacks/ha 60-90 days after planting (side-dressed); (2) 15-15-15 at 4-6 sacks/ha at planting and ammonium sulphate at 4-6 sacks/ha 60-90 days after planting (in the furrow); (3) 15-15-15 at 4-6 sacks/ha both at planting and 60-90 days after planting (banded around the plant). (CIAT)

0202

27615 NOGUEIRA, F.D.; PAULA, M.B. DE; TANAKA, R.T.; ANDRADE, A.M.S. DE 1985. Interacao entre níveis de calagem e de zinco para a cultura da mandioca em solo sob vegetacao de cerrado. (Interaction between liming and zinc levels for cassava yield in cerrado soil). Revista Brasileira de Mandioca 3(2):99-104. Pt., Sum. Pt., En., 18 Ref. [Empresa de Pesquisa Agropecuária de Minas Gerais, Caixa Postal 176, 37.200 Lavras-MG, Brasil]

Cassava. Agricultural lime. Zinc. Savannas. Root productivity. Brazil.

A field expt. was conducted in a Dark Red Latosol, cerrado phase, in Curvelo (Minas Gerais, Brazil) to study the effects of lime and Zn applied at 4 levels on cassava cv. Branca de Santa Catarina. Significant yield

response was obtained for the treatment where lime and Zn sulfate were applied at 1.0 t and 7.5 kg/ha, resp. The highest root yield (16.75 t/ha) was obtained with this treatment, surpassing the control (14.51 t/ha). The soil received a basic fertilization only during the 1st yr and 2 harvests were possible. No residual effect of the treatments was observed in the 2nd harvest. Some chemical characteristics of the soil were significantly modified. (AS)

0203

27616 PAULA, M.B. DE; NOGUEIRA, F.D.; TANAKA, R.T.; ANDRADE, A.M.S. 1985. Efeitos de calagem, potássio, zinco e boro na cultura da mandioca em solo sob cerrado. (Effects of the application of lime, potassium, zinc, and boron on cassava grown in cerrado soils). Revista Brasileira de Mandioca 3(2):61-67. Pt., Sum. Pt., En., 22 Ref. [Empresa de Pesquisa Agropecuária de Minas Gerais, Caixa Postal 176, 37.200 Lavras-MG, Brasil]

Cassava. Agricultural lime. Zn. Boron. K. Savannas. Soil analysis. Root productivity. Brazil.

A field expt. was conducted on an Oxisol (Curvelo, Brazil) to evaluate the effects of K (60, 120, and 180 kg/ha), liming (0, 1, and 2 t calcitic limestone/ha), Zn (5 kg/ha), and B (1.5 kg/ha) on cassava root and aerial part production and soil chemical properties. Zn increased root production only in the 1st harvest and had no residual effect. Root production was not affected by applying B in addition to Zn, and the yield was not increased by liming or K application. Liming increased pH values and Ca contents and reduced exchangeable Al in the arable layer. Soil Mg content was reduced by liming with application of 180 kg K/ha. In soils with a high K level (103 ppm) the 60 kg K/ha rate maintained an adequate K content (78 ppm) for cassava cultivation after the 1st harvest. (AS)

0204

28162 POWELL, J.M.; WATERS-BAYER, A. 1985. Interactions between livestock husbandry and cropping in a West African savanna. In Tothill, J.C.; Mott, J.J., eds. Ecology and management of the world's savannas. Queensland, Australia, Commonwealth Agricultural Bureaux. pp.252-255. En., Sum. En., 9 Ref. [International Livestock Centre for Africa. Subhumid Programme, P.M.B. 2248, Kaduna, Nigeria]

Cassava. Savannas. Cultivation. Cattle. Nigeria.

The integration of livestock and crop production in Abet, a village located in southern Kaduna State, Nigeria, is under study with a view to design innovations which could strengthen the links and benefit both sectors. Cassava is one of the major crops grown; it is generally planted on ridges, and mixed cropping is widespread. Since all operations are done manually, labor is the major input. The benefits and conflicts of the integrated system are described. On-farm expt. with small-scale pastures and undersowing of legumes in cereal crops and in small-scale fenced fodder banks are also being conducted. (CIAT)

0205

28308 SAUTI, R.F.N. 1986. Cassava & sweet potato review 1960-1985. Thondwe, Malawi, Root and Tuber Crops Research. 34p. En., 8 Ref. [Makoka Agricultural Research Station, Private Bag 3, Thondwe, Malawi]

Cassava. Fertilizers. Minerals. Planting. Spacing. Harvesting. Timing. Root productivity. Intercropping. Maize. Sorghum. Mononychellus tanajoa. Phenacoccus manihoti. Cassava African mosaic virus. Cassava flour. Organoleptic examination. Cassava programs. Malawi.

The activities carried out on cassava and sweet potato in Malawi during 2 periods (1960-77 and 1977-85) are summarized and the need for further research on root and tuber crops is stressed. Main cassava production constraints in the country are indicated: diseases and pests (Bemisia tabaci, Mononychellus tanajoa, Phenacoccus manihoti); technical (lack of trained personnel); cultural (lack of high yielding var., planting time, plant populations, seed selection, crop hygiene); and socioeconomic factors (price structure, absence of established marketing system and adequate processing and packaging system). Four cassava var. have bean released, namely Gomani, Chitembwere, Mbundumali/Manyokola, and Nyasungwi. Results of trials on var. x fertilization x harvest time, var. x fertilization, and spacing are given. The cassava breeding program is described and the different agronomic trials conducted, among them cassava/maize and cassava/sorghum intercropping, are detailed. The effect of M. tanajoa x planting time x var. on cassava yields and its chemical control in different var. were also studied. The results of studies on the processing of CF and crisps are given. (CIAT) See also 0185 0189 0192 0193 0194 0279 0296 0301 0308 0361 0379 0382 0385 0387 0388

D02 Cultivation Practices: Propagation, Planting, Weed Control and Harvesting

0206

28156 ADEMOSUN, O.C. 1986. Determination of the optimum capacities of farm machines to adapt for a medium-scale multi-crop production. Agricultural Systems 21(1):33-57. En., Sum. En., 9 Ref., Il. [Dept. of Agricultural Engineering, The Federal Polytechnic, PMB 5351, Ado-Ekiti, Ondo State, Nigeria]

Cassava. Planting. Land preparation. Harvesting. Agricultural equipment. Tillage. Timing. Technology Evaluation. Mechanization. Nigeria.

Operations required for the production of early maize, late maize, groundnut, cowpea, cassava, and yams, each on a 100-ha farm, are identified as well as the various farm machines used for each operation. The duration of each operation using each of the suitable farm machines is also calculated. A network is constructed and a network analysis performed. With the aid of simulation, the capacities of the machines required for mechanized operations and the man-days required for selected nonmechanized operations are determined, such that each operation is completed within the time schedule. Hence, the no. and capacity of each machine required for the mechanized operations and the no. of men required for the nonmechanized operations are selected, and the farming calendar for the year is made. (AS)

0207

27700 DRUMMOND, O.A. 1986. Plantio de mandioca em camalhoes. (Cassava planting on ridges). Belo Horizonte-MG, Brasil, Empresa de Pesquisa Agropecuária de Minas Gerais. Pesquisando no.171. 4p. Pt., Il. [Empresa Brasileira de Pesquisa Agropecuária. Empresa de Pesquisa Agropecuária de Minas Gerais, Caixa Postal 515, 30.188 Belo Horizonte-MG, Brasil]

Cassava. Planting. Land preparation. Root productivity. Brazil.

The results are presented of 3 expt. carried out under different climatic and soil conditions of the Brazilian Cerrados (Felixlandia, Itaguí, and Piracicaba) to demostrate the benefits of planting cassava on ridges. Yields of cassava cv. Sonora in Felixlandia were not significantly different between ridge and non-ridge planting (30.38 vs. 29.06 t/ha, resp.), but the former proved highly economical. Root yields of cassava var. SF 2577 and 2676 in Itaguí were considerably higher at 8 and 18 mo.

after planting when ridge planted compared with non-ridge planting: 12.6 and 35.5 t/ha at 8 and 18 mo. vs. 9.8 and 26.7 t/ha, resp., for SF 2577 and 18.1 and 46.6 t/ha at 8 and 18 mo. vs. 8.2 and 30.5 t/ha, resp., for SF 2676. Root yields in Piracicaba were also significantly higher when planted on ridges than when not (80.4 vs. 53.4 t/ha, resp.). It was found that cassava ridge planting provided better conditions for root formation, facilitated weed control, hilling before the germination of cassava cuttings, harvesting, and mechanization, improved soil water retention, reduced production costs by 75 percent, and controlled soil erosion. (CIAT)

0208

27688 FONDO NACIONAL DE INVESTIGACIONES AGROPECUARIAS. VENEZUELA. 1984. Yuca. (Cassava). In _____. Informe Anual 1984. Bramón, Estación Experimental Táchira. pp.71-77. Es.

Cassava. Cultivars. Root productivity. Harvest index. Dry matter. Starch content. Weeding. Herbicides. Fertilizers. Ammonium sulphate. K. Venezuela.

The 1984 annual cassava research report of the Fondo Nacional de Investigaciones Agropecuarias, of the Tachira exptl. station (Venezuela), is presented. Twelve sweet and bitter cassava cv. of the germplasm bank were evaluated for yield, HI, DM, and starch content. Yields ranged between 17,500-42,647 kg/ha and showed good DM and starch contents. Seven herbicide treatments were tested using cassava cv. Llanerita; the highest yields were obtained with fluometuron 2.5 kg/ha + alachlor 3.0 liters/ha (28,520 kg/ha), diuron 1.5 kg/ha + alachlor 3.0 liters/ha (27,111 kg/ha), and linuron 1.5 kg/ha + alachlor 2.5 liters/ha (24,530 kg/ha). In terms of commercial root no., the best treatment was the latter. The results of the best 10 NPK fertilizer treatments are given with yields ranging between 33,304-47,874 kg/ha; the highest yield was obtained at 150-110-100 NPK. (CIAT)

0209

27384 INSTITUT DE RECHERCHES AGRONOMIQUES TROPICALES ET DES CULTURES VIVRIERES. 1982. Efficacité et sélectivité de nouveaux herbicides manioc. (Effectivity and selectivity of new herbicides for cassava). In _____. Rapport des Activites en 1982. Guyane. Fiche d'Essai no.15. 4p. Fr.

Cassava. Herbicides. Weeds. Root productivity. Starch content. Harvest index. French Guiana.

Herbicide trials were carried out at the Institut des Recherches Agronomiques Tropicales et des Cultures Vivrieres in Cabassou (French Guiana) in 1982. On a ferralitic granitic soil, complete weed protection was achieved with oxyfluorfen + dalapon at 1.4 + 4.3 kg a.i./ha. (CIAT)

0210

27601 MALDONADO C., B.; SANTOS S., J.; ESPAÑA C., J.M. 1982. Control químico de malezas en yuca (Manihot esculenta, Crantz) en suelo arenoso de la región de Media Luna, Magdalena. (Chemical weed control in cassava on sandy soil from the Media Luna region of Magdalena). Revista Agronómica (Colombia) 5(1-4):85-92. Es., Sum. Es., 10 Ref.

Cassava. Weeding. Herbicides. Root productivity. Foliage. Plant development. Economics. Colombia.

During a 10-mo.-period (April 1981-Feb. 1982), the recommended application rate of oxyfluorfen for cassava cv. Secundina was evaluated on a sandy soil of the Media Luna region of Magdalena (Colombia), and the control rate for

this chemical was compared with known control rates for diuron + alachlor and oxadiazon. During the trial, the mean annual temp. was 27 degrees Celsius and the mean annual rainfall was 1076.90 mm. A randomized block design was used with 4 replications and 7 exptl. plots (for a total of 28 plots). A planting distance of 1.00 x 1.20 m was used. Best weed control was achieved by the treatment diuron + alachlor (1 kg = 2.01), followed by oxyfluorfen 4.01 (over 80 percent weed control). All herbicides showed a low level of toxicity, which in the case of cassava-selective chemicals was equal to 0. Best yields were obtained with oxyfluorfen 2.01, followed by diuron + alachlor. (AS-CIAT)

0211

26162 MAQUINAS AGRICOLAS SANS. BRASIL. s.f. Plantadora de mandioca SANS. (SANS cassava planter). Santa Barbara d'Oeste-SP., Brasil. 2p. Pt., Il.

Cassava. Planting. Agricultural equipment. Brazil.

A brief technical description and the advantages of a tractor-pulled cassava planter/fertilizer are presented. With 3 operators, an av. of 1 ha is planted per hour, with a labor saving value of approx. 80 percent. (CIAT)

0212

26897 PEZO, D.; BENAVIDES, J.; RUIZ, A. 1984. Producción de follaje y raíces de yuca (Manihot esculenta, Crantz) bajo diferentes densidades de plantación y frecuencia de poda. (Cassava root and foliage production at different plant densities and pruning frequencies). Producción Animal Tropical 9(3):251-262. Es., Sum. Es., 26 Ref., Il. [Centro Agronómico Tropical de Investigación y Enseñanza, Turrialba, Costa Rica]

Cassava. Foliage. Root productivity. Planting. Spacing. Pruning. Timing. Protein content. Dry matter. Biomass production. Costa Rica.

Two expt. were carried out to evaluate the effect of plant densities and pruning frequencies on root and foliage production of 2 cassava var. In the 1st expt. 4 plant densities (6667, 10,000, 40,000, and 111,111 plants/ha) and 4 pruning frequencies (at 1, 2, 3, and 4 mo.) were studied in cassava var. Valencia; in the 2nd expt. 3 pruning frequencies (at 1.5, 3.0, and 4.5 mo.) were evaluated in cassava var. Japonesa, at a constant plant density (6667 plants/ha). Control treatments (unpruned) were included in both expt. and for the pruning treatments, the 1st pruning was done at 4 mo. In cassava var. Valencia, root and foliage production tended to increase with higher plant densities; an opposite trend, however, was observed for the percentage of commercial roots. Pruning favored foliage productivity (P equal to or less than 0.05) and no differences were detected for pruning frequencies. Root productivity and commercial root percentage were negatively affected (P equal to or less than 0.05) only by monthly pruning. In cassava var. Japonesa, pruning reduced (P equal to or less than 0.05) total and commercial root production, particularly with frequent prunings. In this var. pruning favored (P equal to or less than 0.05) foliage production, but higher foliage yields (P equal to or less than 0.05) were obtained with less frequent prunings. On the other hand, at a constant plant density, Japonesa revealed a higher foliage production potential than Valencia. Data are also given on CP contents and in vitro DM digestibility for the 2 var. Cassava var. Valencia is recommended for the simultaneous production of foliage and roots, and var. Japonesa for the exclusive production of foliage or roots. (AS (extract)-CIAT) See also 0205 0230 0279 0296 0375 0378 0390 0391

0213

27608 CARVALHO, V.D. DE; CHALFOUN, S.M.; JUSTE JUNIOR, E.S.G. 1985. Métodos de armazenamento na conservacao de raízes de mandioca. 2. Efeito da embalagem de polietileno e serragem úmida associadas a tratamentos químicos nos teores de umidade, amido e acúcares das raízes. (Storage methods for preserving fresh cassava roots. 2. Effect of polyethylene bags and moist sawdust packing associated with chemical treatments on moisture, starch, and sugar contents of cassava roots). Revista Brasileira de Mandioca 3(2):105-113. Pt., Sum. Pt., En., 6 Ref. [Empresa de Pesquisa Agropecuária de Minas Gerais, Caixa Postal 176, 37.200 Lavras-MG, Brasil]

Cassava. Roots. Storage. Packaging. Water content. Sugar content. Starch content. Harvesting. Timing. Brazil.

Roots of cassava cv. Mantiqueira were packed in polyethylene bags and moist sawdust after immersion for 5 min in solutions containing 0.60 percent maneb, 0.25 percent ascorbic acid, or water (check), to determine their effect on root moisture, starch, and sugar contents. Total and reducing sugars contents increased during the storage period. Total sugars increases, however, were not correlated with starch decreases. No significant correlation was observed between MC and days after harvest. Starch contents decreased when roots were packed in polyethylene bags plus 0.25 percent ascorbic acid, in moist sawdust plus 0.60 percent maneb, and in the check. (AS)

0214

26900 HIROSE, S.; DATA, E.S.; TANAKA, Y. 1984. Physiological deterioration and ethylene production in cassava roots after harvest, in relation with pruning treatment. Japanese Journal of Crop Science 53(3):282-289. En., Sum. En., Ja., 27 Ref., Il. [College of Agriculture & Veterinary Medecine, Nihon Univ., Setagaya-ku Tokyo 154, Japan]

Cassava. Roots. Deterioration. Pruning. Timing. Plant physiology. Cultivars. Plant respiration. Japan.

Changes in respiratory rate and ethylene production in roots or tissue blocks from both pruned and unpruned cassava plants were examined. The effects of endogenous and exogenous ethylene on physiological deterioration were also investigated. Ethylene production was detected in tissue blocks after 15-16 h incubation and reached a max. value about 1 day after incubation. Ethylene production was higher in cassava than in sweet potato roots. Var. differences in the amount of ethylene production were observed in the following decreasing order: cv. Golden Yellow, CCS-1984, Hawaiian-, CCS-167. Deteriorated root tissue blocks produced 4 times as much ethylene as undeteriorated ones. A slight quantitative difference in ethylene production between pruned and unpruned tissue blocks was found and an earlier peak of ethylene production appeared in unpruned than in pruned ones. Results of ethylene absorbent treatment did not seem to have a direct effect on the progress of physiological deterioration. The respiratory rate in the exogenous ethylene-treated tissue showed little or no difference compared with untreated ones. Slight progress of physiological deterioration was observed in the ethylene-treated tissue blocks from both pruned and unpruned plants. No clear difference was found between pruning and nonpruning treatments with respect to ethylene production and respiratory rate. On the other hand, the physiological effect of pruning may be lowered by mechanical injury. (AS (extract)) See also 0215 0302 0324 0364

E00 PLANT PATHOLOGY See 0312 0317 0377

E02 Bacterioses

0215

28151 HERNANDEZ M., J.; LOZANO T., J.C. 1985. Efecto y características de algunos aislamientos de rizobacterias fluorescentes en genotipos de yuca (Manihot esculenta Crantz). (Effect and characteristics of some isolates of fluorescent rhizobacteria in cassava genotypes). Acta Agronómica 35(1):61-80. Es., Sum. Es., En., 41 Ref., Il.

Cassava. Bacterioses. Pseudomonas. Erwinia carotovora. Roots. Deterioration. Inoculation. Colombia.

Selected strains of fluorescent Pseudomonas spp., isolated from the rhizosphere of cassava plants growing in different areas of Colombia, produced statistically significant increases in root fresh wt. and decreased the incidence of root rots when seedlings or cuttings were inoculated before planting at different concn. and application intervals. Immersion of roots of susceptible cassava clones in bacterial suspensions prior to storage considerably reduced the microbial deterioration and superficial fungal growth that normally occur when cassava roots are stored. Selected strains of the fluorescent rhizobacteria cause significant in vitro antibiosis against various bacterial pathogens causing root rots such as Erwinia carotovora pv. carotovora. Based on characterization trials, the selected fluorescent isolates were characterized taxonomically as P. putida (isolates F-44, F-64, F-61, F-71, F-56) and P. fluorescens (isolate F-87). (AS)

0216

28129 LOZANO, J.C. 1986. Cassava bacterial blight: a manageable disease. Plant Disease 70(12):1089-1093. En., 10 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Xanthomonas campestris pv. manihotis. Symptomatology. Etiology. Epidemiology. Resistance. Disease control. Colombia.

The results of research and extension programs to develop and apply integrated control measures of CBB are discussed. They have enabled the disease to be now considered of minor importance in many cassava growing areas. Disease symptoms, yield losses, etiology, and epidemiology are described. Losses caused by CBB have been notably reduced in recent years by a combination of cultural practices, var. resistance, biological control measures, and sanitation measures. Effective control measures are crop rotation, planting at the end of the rainy season, planting of disease-free material, and pruning the aboveground portion of infected plants to delay the spread of the disease and secondary infections. The use of var. resistant to Xanthomonas campestris pv. manihotis has also been possible. The use of foliar applications of Pseudomonas fluorescens and P. putida strains to control the disease is being studied; these applications have been found to reduce the no. of angular leaf spots and the no. of blighted leaves/plant in susceptible clones. Sanitation control measures include the use of healthy planting material, the use of tissue culture for international germplasm exchange, and the treatment of cassava seeds with dry heat. As examples, 2 places where CBB control has been successful, Colombia and Cuba, are cited. (CIAT)

0217

28102 1986. AFRICAN CASSAVA threatened. Spore no.4:1-3. En., Il.

Cassava. Cassava African mosaic virus. Phenacoccus manihoti. Mononychellus tanajoa. Xanthomonas campestris pv. manihotis. Xanthomonas campestris pv. cassavae. Predators and parasites. Disease control. Mite control. Insect control. Africa.

The way international research efforts and African nations are facing the biotic factors threatening cassava in Africa is discussed. Severe diseases caused by Xanthomonas campestris and CAMV are being controlled by developing resistant cassava var. Severe insect pests, such as Phenacoccus manihoti and Mononychellus tanajoa, are being controlled through integrated control measures and the use of natural biological controls, which are being mass-reared and released in Africa. (CIAT)

E04 Viroses

0218

27604 MOHANRAJ, V.; NARAYANASAMY, P. 1984. Detection of cassava mosaic virus infection in plant materials by application of serological tests. Madras Agricultural Journal 71(3):207-209. En., 2 Ref. [Dept. of Plant Pathology, Tamil Nadu Agricultural Univ., Coimbatore 641003, India]

Cassava. Cassava African mosaic virus. India.

Results are reported of a modified method for the preparation of antiserum and the testing of cassava planting material. It is concluded that serological tests can be advantageously used to detect CAMV infection and to select healthy planting material. (CIAT)

0219

26884 MULLINEAUX, P.M.; DONSON, J.; MORRIS-KRSINICH, B.A.M.; BOULTON, M.I.; DAVIES, J.W. 1984. The nucleotide sequence of maize streak virus DNA. European Molecular Biology Organization Journal 3(13):3063-3068. En., Sum. En., 30 Ref., Il. [John Innes Inst., Colney Lane, Norwich NR4 7UH, England]

Cassava. Cassava latent virus.

The nucleotide sequence of the DNA of maize streak virus was determined. The data were accommodated into one DNA circle of 2687 nucleotides, in contrast to previously characterized geminiviruses, which have been shown to possess 2 circles of DNA. Comparison of the nucleotide sequences of the DNA of maize streak virus with those of CLV and tomato golden mosaic virus showed no detectable homology. Analysis of open reading frames revealed 7 potential coding regions for proteins of mol. wt. equal to or greater than 10,000, 3 in the viral (+) sense and 4 in the complementary (-) sense. The position of likely transcription signals on the maize streak virus DNA sequence would suggest a bidirectional strategy of transcription as proposed for CLV and tomato golden mosaic virus. Nine inverted repeat sequences have been detected; 3 of the hairpin structures formed are in noncoding regions and could be involved in the regulation of transcription and/or replication. (AS) See also 0188 0205 0217 0230

F00 PEST CONTROL AND ENTOMOLOGY

0220

27633 BECKER, V.O. 1986. Correct name for the species of Chilozela (Lepidoptera: Pyralidae) whose caterpillars damage cassava in South

America. Bulletin of Entomological Research 76(2):195-198. En., Sum. En., 10 Ref., Il. [Centro de Pesquisa Agropecuária dos Cerrados, P.O. Box 70-0023, 73.300 Planaltina-DF, Brasil]

Cassava. Entomology. Chilozela trapeziana. Brazil.

A brief review is given on the taxonomic classification undergone by Chilozela trapeziana (Sepp) comb. n. This is the senior name for the pyralid whose larvae damage cassava leaves in South America, and Botys jatrophalis Walker syn. n. and Phlyctaenodes bifilalis Hampson syn. n. are junior synonyms. Illustrations of the adult form and of male and female genitalia are included. (AS)

0221

28164 BERLINGER, M.J. 1986. Host plant resistance to Bemisia tabaci. Agriculture, Ecosystems and Environment 17(1-2):69-82. En., Sum. En., 68 Ref. [Entomology Laboratory, ARO, Gilat Regional Experiment Station, Mobile Post, Negev, Israel]

Cassava. Resistance. Bemisia. Entomology. Israel.

Host plant resistance to Bemisia tabaci is reviewed and discussed with particular reference to damage, senses of the pest (vision, smell, taste, contact), distribution, host plant recognition, resistance mechanisms, and methods. Breeding programs for resistance in cassava, cotton, and tomato are also discussed. (CIAT) See also 0312 0317 0361 0371

F01 Injurious Insects and their Control

0222

27699 ARLEU, R.J.; FURTADO, M.J.; FANTON, C.J. 1986. Flutuacao populacional do Erinnyis ello (L., 1758) em mandioca, no municipio de Linhares, Espírito Santo. (Fluctuation of Erinnyis ello populations in cassava in Linhares, Espírito Santo). Cariacica-ES, Brasil, Empresa Capixaba de Pesquisa Agropecuária. Comunicado Técnico no.45. 6p. Pt., Il. [Empresa Capixaba de Pesquisa Agropecuária, Caixa Postal 125, 29.154 Cariacica-ES, Brasil]

Cassava. Erinnyis ello. Entomology. Insect biology. Brazil.

A trial was established in Linhares (Espírito Santo, Brazil) to study the fluctuation of Erinnyis ello populations in cassava using UV light traps. Light traps were checked at 7-day intervals from Nov. 1979 through Aug. 1985. E. ello population peaks occurred in Feb. 1980, Jan. and March 1981, Jan. 1983, Aug. and Nov. 1984, and March 1985. Higher populations were always observed during the rainy season. In general, the highest peaks are expected in January followed by Feb. and March. Light traps were useful to reduce E. ello populations and should be set up at weekly intervals between Oct. and March and biweekly intervals between April and Sept. A min. of 1 light trap/10 ha is recommended. (CIAT)

0223

28161 AYANRU, D.K.G.; SHARMA, V.C. 1986. Effects of mite (Mononychellus tanajoa) and mealybug (Phenacoccus manihoti) infestation on the mineral status of a cassava clone. Agriculture, Ecosystems and Environment 18(1):73-81. En., Sum. En., 24 Ref., Il. [Dept. of Microbiology, Univ. of Benin, Benin City, Nigeria]

Cassava. Mononychellus tanajoa. Phenacoccus manihoti. Pest damage. Mineral content. Roots. Stems. Leaves. N. P. K. Ca. Mg. Na. Timing. Nigeria.

Polithion-sprayed and unsprayed plants of cassava clone TMS/U 30395 were

evaluated monthly for infestations by mites (Mononychellus tanajoa) and mealybugs (Phenacoccus manihoti) in plots in Ugbowo, Nigeria. The plants were sampled for mature lamina, stem, and tuber parenchyma tissues and analyzed for 9 mineral elements: N, P, K, Ca, Mg, Na, Fe, Mn, and Zn. Conen. of P and K in all the tissues sampled varied from 0.09 to 0.38 and from 0.25 to 1.46 percent, resp., and were significantly lower (P less than 0.01) in tissues of severely pest-infested (unsprayed) cassava than in those of healthy (sprayed) plants. Also, diminished values of Fe, Mn, and Zn in roots and stems, and of Mg and N in leaves of pest-infested plants were found; however, contents of Ca in all tissues, Mg and Na in roots, and N in roots and stems of pest-infested and defoliated plants were considerably higher than those in tissues of healthy stands. The physiological bases for the pest-induced elemental conen. imbalances are discussed. (AS)

0224

27660 BLANTON, C.M.; EWEL, J.J. 1985. Leaf-cutting ant herbivory in successional and agricultural tropical ecosystems. Ecology 66(3):861-869. En., Sum. En., 43 Ref., Il. [Dept. of Botany, Univ. of Florida, Gainesville, FL 32611, USA]

Cassava. Atta. Leaf area. Pest damage. Analysis. Costa Rica.

Herbivory by Atta cephalotes was measured in 4 plant communities of different complexity in Costa Rica: a monoculture of cassava and 3 diverse assemblages, each 1.5 yr old, namely (1) successional vegetation, unmodified by the investigators; (2) imitation of succession, a community of investigator-introduced species designed to mimic the unmodified succession; and (3) enriched succession, a successional vegetation that the investigators had augmented by propagule inputs. Each ant colony had access to all 4 community types simultaneously. The av. herbivory rate (daily cutting of leaf/square meter of ground, all treatments combined) was approx. 150 mg (or 38 square centimeters. In communities with greater LAI, structural complexity, and species richness, A. cephalotes cut lower portions of total leaf area. Before harvest of the cassava monoculture, the herbivory rate of A. cephalotes was 87.9 square centimeters/square meter/day in the monoculture, 21.4 in the imitation, 14.7 in the succession, and 6.8 in the enriched succession community. These amounts represented 0.3 percent of total leaf area in the monoculture and a mean of 0.03 percent of total leaf area in the 3 complex ecosystems. Cassava, which occurred in 3 of the 4 communities, was attacked most heavily (per unit leaf area) in the imitation successional community, least heavily in the enriched succession, and at intermediate intensity in the monoculture. In response to loss of their preferred forage (cassava) through harvesting by humans, the ants cut more leaf tissue in the 3 species-rich communities, especially the imitation. As cassava resprouted in the monoculture, A. cephalotes' rate of attack on the 3 diverse treatments returned to preharvest levels. A. cephalotes cut only 17 of 332 available plant species. They cut proportionally more woody than herbaceous species, more introduced species than natural colonizers, and species with below-av. water contents. Plant relative abundance alone did not determine host plant selection, but most of the attacked species were cut in proportion to their total leaf area. (AS)

0225

28197 BOUSSIENGUET, J. 1986. Le complexe entomophage de la cochenille du manioc, Phenacoccus manihoti (Hom. Coccoidea Pseudococcidae) au Gabon. 1. Inventaire faunistique et relations trophiques. (The entomophagous insect complex of the cassava mealybug, Phenacoccus manihoti (Hom. Coccoidea Pseudococcidae) in Gabon. 1. Faunistic review and trophic relationships). Annales de la Societe Entomologique de France 22(1):35-44. Fr., Sum. Fr.,

En., 26 Ref., Il. [Faculté des Sciences, Laboratoire de Zoologie et de Lutte biologique, Univ. O. Bongo, B.P. 1886, Libreville, Gabon]

Cassava. Phenacoccus manihoti. Predators and parasites. Gabon.

A review of the known natural enemies of Phenacoccus manihoti in equatorial Africa is presented. The indigenous entomophagous insects of this cassava pest were collected in Gabon during 3 yr. The occurrence of 2 primary parasites, 4 hyperparasites, 9 predators, and 8 parasites of predators is reported and their relationships are defined. Data are given on their relative abundance as well as on their period of occurrence and rates of parasitism. The abundance and the importance of hyperparasites and of parasites of predators are reported. (AS)

0226

28181 EMEHUTE, J.K.U. 1986. A review of pesticide usage in the control of cassava mealybug, Phenacoccus manihoti Matile-Ferrero (Pseudococcidae) and green spider mite, Mononychellus tanajoa Bondar (Tetranychidae). Umudike, Umuahia, Nigeria, National Root Crops Research Institute. 12p. En., Sum. En., 21 Ref. Paper presented at the 19th Annual Conference of Entomological Society of Nigeria, Ile, Ife, 1986. [National Root Crops Research Inst., Umudike, Nigeria.]

Cassava. Phenacoccus manihoti. Mononychellus tanajoa. Insect control. Mite control. Insecticides. Nigeria.

The history and status of 2 important pests, Phenacoccus manihoti and Mononychellus tanajoa, in the cassava belt of Africa are briefly outlined. Results of some pesticide expt. to control P. manihoti and M. tanajoa are highlighted. Generally, yields obtained in chemically treated plots were not significantly better than yields in untreated plots. On this basis, and taking into account the high costs and risks involved, it is concluded that the emphasis placed on pesticide use to control both pests should be reconsidered. Pesticide use, however, could be recommended for exptl. and commercial farms. (AS)

0227

27623 LAL, S.S. 1983. Field evaluation of certain insecticides against white grub, Leucopholis coneophora Burm. attacking cassava. Madras Agricultural Journal 70(8):556. En., 2 Ref. [Indian Agricultural Research Inst., Regional Station, Kalyanpur, Kanpur 208024, India]

Cassava. Leucopholis coneophora. Insecticides. Field exporiments. India.

Nine insecticides were evaluated as dust or granular formulations at 1.5 kg a.i./ha in Chomady (Kerala, India) against Leucopholis coneophora in plots of cassava cv. Burma. Insecticides were soil incorporated at planting. Carbofuran and phorate provided max. protection against the pest (98.1 and 94.4 percent plant survival). Based on survival percentage of plants the insecticides were ranked as follows: carbofuran = phorate better than quinalphos better than lindane better than disulfoton better than Sevidol better than parathion better than carbaryl better than ethoprop better than control. (CIAT)

0228

27695 URIAS L., M.A. 1986. Efecto de la temperatura y de insecticidas sobre el parasitismo y desarrollo de enemigos naturales del gusano de cuerno Erinnyis ello (L.). (Effect of the temperature and insecticides on parasitism and development of natural enemies of the cassava hornworm Erinnyis ello). Tesis Mag.Sc. Chapingo, México, Colegio de Postgraduados. 115p. Es., Sum. Es., 54 Ref.

Cassava. Erinnyis ello. Predators and parasites. Biological control. Insecticides. Temperature. Colombia.

Parasitism and development of Trichogramma exiguum and Telenomus sphingis were evaluated at different temp. to determine their rates and threshold temp. of development as well as the heat requirements of each one. The approx. duration per generation, net reproduction rate, and inherent multiplication capacity were determined at each temp. The effect of ethyl parathion, trichlorfon, diflubenzuron, and Bacillus thuringiensis on the development of both species was also evaluated, as well as the effect of these insecticides on the adults of both species and adults and pupae of Apanteles congregatus. A simple methodology to rear A. congregatus was attempted. Five replications each were carried out with 6 T. sphingis females and 10 T. exiguum females. Individual females were confined in plastic jars and fed daily with fresh eggs of the pest. T. exiguum was tested at 20.0, 25.0, and 30.0 degrees Celsius and T. sphingis at the same temp. plus an additional one at 32.5 degrees Celsius. The insecticides were applied to Erinnyis ello eggs before and after being parasitized. Some of the females were confined to parasitize E. ello eggs without insecticide. The product was contact applied to adult tarsi. T. exiguum females were more productive at 25 and 20 degrees Celsius. At 25 degrees Celsius 92 percent of them parasitized whereas at 20 degrees Celsius only 66 percent (av. of 4.2 and 2.5 eggs, resp.). Sex ratios were more favorable at 25 and 30 degrees Celsius (7.4 and 7.6 females/male, resp.) than at 20 degrees Celsius (1.5). Regarding T. sphingis, the highest productivity was obtained at 25 and 30 degrees Celsius; at these temp. 100 and 76.7 percent of the females parasitized, resp., with 5.9 and 6.2 parasitized eggs/female. The sex ratio remained unchanged. The highest development rate of T. exiguum and T. sphingis occurred at 30.0 degrees Celsius, the min. threshold at 13.5 and 14.2 degrees Celsius, resp., and the physiological period of 95.6 and 123.1 degrees-days, resp. No max. threshold was obtained for T. exiguum, but that of T. sphingis was of 30 degrees Celsius. The optimal population growth for both species was obtained at 25 degrees Celsius. At each temp. the rm value was higher for T. exiguum. Ethyl parathion and trichlorfon inhibited parasitism and affected the longevity and productivity of T. exiguum and T. sphingis; they also affected the development of parasitoides inside the eggs. Diflubenzuron and trichlorfon affected the parasitic action of females from eggs before and after being parasitized; B. thuringiensis had no negative effects on any of the parameters studied. When insecticides were applied to eggs that were previously parasitized, 80 and 70 percent of the eggs produced no adults in treatments with parathion and trichlorfon, resp., in T. exiguum compared with 96 and 91 percent in T. sphingis. Parathion and trichlofon were the most toxic for adults of both species. The rearing of A. congregatus was feasible when adults of the parasite were maintained using 1st-instar larvae of the pest in wooden cages with 1 cassava plant (25 degrees Celsius and 75 percent RH during 24 h). (AS (extract)-CIAT) See also 0195 0205 0217 0230

F02 Rodents and other Noxious Animals

0229

28315 LIN. Y.M.; CHEN, P.Z. (Preliminary observations on Stethorus (Allostethorus) parapauperculus). Natural Enemies of Insects 6(3):126-128. Ch., 3 Ref., Il.

Cassava. Predators and parasites. Tetranychus urticae. China.

In 1981 Stethorus parapauperculus was observed preying on Tetranychus urticae infecting cassava. Its biology is described. (CIAT)

G00 GENETICS AND PLANT BREEDING

G01 Breeding, Germplasm, Varieties and Clones, Selection

0230

26852 DE LANNOY, G. 1984. Elements de bases pour un programme d'amelioration du manioc au Senegal. (Basic elements for a cassava improvement program in Senegal). Dakar, Senegal, Ministere de la Recherche Scientifique et Technique. Institut Senegalais de Recherches Agricoles. 46p. Fr., Il.

Cassava. Cassava programs. Plant breeding. Germplasm. Cultivars. Plant development. Propagation. Cuttings. Rooting. Planting. Nutritive value. Composition. Roots. Root productivity. Cassava African mosaic virus. Phenacoccus manihoti. Resistance. Senegal.

The general situation of cassava cultivation in Senegal is described and the main results are given of research carried out to date on the establishment of a basic collection, development of the aerial part, influence of physiological age of cuttings and their position, characterization of var., chemical composition and nutritive value, incidence of mosaic on cassava growth and yield, and genetic improvement. Conclusions and recommendations are given regarding the selection of resistant var. and the use of appropriate cultural techniques for the control of CAMD and mealybugs, as well as biological control measures and measures against drought. (CIAT)

0231

28118 NG, S.Y.; HAHN, S.K. 1986. Application of tissue culture to tuber crops at IITA. In Inter-Center Seminar on International Agricultural Research Centers and Biotechnology, Manila, Philippines, 1984. Biotechnology in international agricultural research. Manila, International Rice Research Institute. pp.29-40. En., Sum. En., 39 Ref., Il. [International Inst. of Tropical Agriculture, Oyo Road, P.M.B. 5320, Ibadan, Nigeria]

Cassava. Biotechnology. Apical meristems. Plant tissues. Tissue culture. Germplasm. Nigeria.

The 5-yr tissue culture research at the International Institute of Tropical Agriculture (Ibadan, Nigeria) is summarized. Meristem culture has been used to eliminate disease in tuber crops: disease-free plants can be distributed in vitro to requesting national programs. Disease-free cassava has been distributed to over 30 countries in Africa. Arrangements for in vitro tuber crop germplasm exchange are described. (AS (extract))

0232

28120 SUBENI; ANWARI, M.; SIEMONSMA, J.S. 1986. Germplasm catalogue cassava (Manihot esculenta Crantz). Indonesia, Malang Research Institute for Food Crops. Agricultural Technical Cooperation Indonesia-The Netherlands ATA 272 Project. 20p. En., Il.

Cassava. Germplasm. Identification. Indonesia.

An updated (Nov. 1986) catalog of the cassava germplasm collection of the Malang Research Institute for Food Crops (Indonesia) is presented. The registration data for 106 accessions of the bank and standard evaluation data of 91 accessions of the collection are tabulated. Registration data covers the basic information on registration date, registration no., country of origin, parents, duplicates, and additional data on the collection site. The standard evaluation data covers 25 records related to

their identification and morphological and agronomic descriptors. (CIAT)
See also 0200 0208 0290 0311 0349 0353 0357 0360 0380

H00 NUTRITION See 0269 0275 0361 0371

H01 Cassava Foods and Nutritive Value

0233

27632 ARIHANTANA, N.I.; BUCKLE, K.A. 1986. Effect of non-enzymic browning, starch and sugars on total cyanide determination in cassava by an enzymic assay. Journal of Food Technology 21(2):189-197. En., Sum. En., 16 Refs. [Dept. of Food Science & Technology, The Univ. of New South Wales, P.O. Box 1, Kensington, New South Wales 2033, Australia]

Cassava. Cassava starch. Fermented products. HCN content. Analysis. Cassava products. Enzymes. Australia.

Maillard (nonenzymic) browning pigments and gelatinized starch interfered in the assay of total cyanide in cassava products by an alkaline picrate-enzymic method. Interference from browning pigments in cyanide determinations was overcome by adding charcoal followed by filtration, while gelatinized starch was precipitated by the addition of ethanol. Glucose, fructose, and maltose but not sucrose also interfered in the assay and produced high total cyanide results. A more specific reaction than alkaline picrate is still required for free cyanide estimations in cassava products. (AS)

0234

28195 DUYILEMI, B.O. 1986. Food plants of Nigeria. Journal of Biological Education 20(1):13-14. En., 7 Refs., Il. [Ondo State College of Education PMB.250, Ikere-Ekiti, Nigeria]

Cassava. Composition. Gari. Foofoo. Nigeria.

Examples of tropical tuber crops (among them, cassava), their chemical constituents, and methods of preparation are discussed with a view to encouraging practical investigations. In Nigeria, cassava is consumed as gari, starch, or fufu. (AS) See also 0242 0253 0261 0271 0277 0283 0321

H02 Nutritive Disorders in Humans

0235

26877 AQUARON, R.; NGUESSI, P.; BEN ENO, L.; RIVIERE, R. 1985. La goitre endémique au Cameroun (Provinces de l'Est et du Nord-Ouest). (Endemic goiter in Cameroon; eastern and northwestern provinces). Revue Francaise d'Endocrinologie Clinique Nutrition et Metabolisme 26(6):537-546. Fr., Sum. Fr., En., 24 Ref., Il. [Laboratoire de Biochimie Médicale et INSERM U 38, Faculté de Médicine, 27, bd Jean-Moulin, 13385, Marseille Cedex 5, France]

Cassava. Toxicity. Clinical manifestations. Endemic goiter. Maps. Human physiology. Iodine. Roots. Leaves. HCN content. Cameroon.

A survey on 142 and 358 goitrous subjects, conducted resp., in eastern and northwestern provinces of Cameroon, showed that the low I intake was the main factor in endemic goiter development in these 2 endemic areas by measuring urinary I excretion in 43 goitrous subjects. Determination of I in water and in some foods (cassava, salt) gave an estimate of the daily I intake between 40-80 micrograms, values lower than normal daily I intake (100-150 micrograms) recommended by the World Health Organization in 1979.

The favorable effect on SCN, which are produced from hepatic detoxication of cyanide (cassava), has been shown by the determination of salivary SCN. (AS)

0236

26876 ASSAN, R.; BOUKERSI, H.; CLAUSER, E. 1984. Cassava panoreatitis in western Europe. Lancet 2(8414):1278. En., 10 Ref. [Diabetes Dept., Hospital Bichat, 75018 Paris, France]

Cassava. Malnutrition. Toxicity. Clinical manifestations. Panoreatitis. Diabetes mellitus. France.

Calcifying pancreatitis due to malnutrition and feeding on nonpurified cassava and causing diabetes mellitus in large parts of tropical Asia, Africa, and South America is reported. This syndrome has also been observed in olinics in Europe. Of 40 adult-diabetics admitted to hospitals because of chronic pancreatitis, 9 had consumed cassava for 10-20 yr, at a rate of 3-10 meals/wk. Clinical features of these patients are discussed. The diabetes was poorly controlled and insulin was required in all cases. Goitre, parotid hypertrophy, ataxic neuropathy, and the cyanotic hue of the lips, as described in the typical tropical cassava syndrome, were not observed. It is recommended that chronic cassava intoxication be kept in mind when investigating a diabetic patient from cassava-consuming countries.(CIAT)

0237

26885 McMILLAN, D.E.; GEEVARGHESE, P.J. 1979. Dietary cyanide and tropical malnutrition diabetes. Diabetes Care 2(2):202-208. En., Sum. En., 39 Ref., Il.

Cassava. Malnutrition. Toxicity. Diabetes. Clinical manifestations. Cyanides. Laboratory animals. Human physiology.

Although 2 categories of diabetes are recognized in the temperate zone, ketosis-prone diabetes requiring insulin and diabetes not requiring insulin, another unique type of diabetes occurs in the tropics. It has 2 forms, both different from either form of temperate zone diabetes. Type J and pancreatic diabetes are both characterized by youth onset, antecedent malnutrition, substantial insulin requirement, and resistance to ketosis. In the tropical countries where they are found, both forms are associated with specific dietary practices, including a nutritionally marginal protein intake. The close association with low protein intake distinguishes this form of diabetes from that occurring in North America, Europe, and Oceania. The geographic distribution of malnutrition diabetes, in addition to being limited to the tropics, coincides regularly with the consumption of cassava or other foods that contain cyanide-yielding substances. Ingested cyanide is normally detoxified, principally, by conversion to SCN. This detoxification requires S, derived principally from amino acid sources. Studies in the rat indicate a remarkable ability to detoxify ingested cyanide, a reduction in urinary SCN excretion when protein intake is lowered (especially during growth), production of marked hyperglycemia by either oral or parenteral cyanide, and the development of cyanosis and epidermal changes when there is prolonged exposure to cyanide. Both the association of malnutrition diabetes with food cyanogens and lab. observations support a role for cyanide in its pathogenesis. (AS)

0238

27651 VANNASAENG, S.; VICHAYANRAT, A.; NITIYANANT, W.; TANDHANAND, S. 1982. Diabetes mellitus in the tropics: a case with pancreatic calcification and chronic cassava toxicity. Journal of the Medical Association of Thailand 65(6):330-332. En., Sum. En., 11 Ref., Il. [Dept.

of Medicine, Faculty of Medicine, Siriraj Hospital, Mahidol Univ., Bangkok 10700, Thailand]

Cassava. Toxicity. Diabetes mellitus. Clinical manifestations. Human physiology. Thailand.

A case of youth-onset diabetes with pancreatic calcification and goiter was reported in a Thai woman aged 22. The history of prolonged consumption of fresh cassava roots without associated protein malnutrition suggests that cyanogenic glycoside from cassava may be the cause of pancreatic damage and goiter in this patient. (AS)

H03 Animal Feeding

0239

27621 GERPACIO, A.L.; PASCUAL, F.S.; QUERUBIN, L.J.; VERGEL DE DIOS, A.F.; MERCADO, C.I. 1978. Evaluation of tuber meals as energy sources. 1. Sweet potato- and cassava-based rations for broilers. Philippine Agriculturist 61:395-410. En., Sum. En., 15 Ref., Il.

Cassava. Cassava meal. Nutritive value. Chicks. Feeds and feeding. Feed constituents. Digestibility. Food energy. Animal nutrition. Philippines.

The performance of 2 wk.-old birds fed with rations containing sweet potato or cassava root meals at 0, 25.0, 37.5, and 50.0 percent levels in the rations (0, 50, 75, and 100 percent replacement of maize) to 6 wk. of age were studied. Parameters used were feed intake, wt. gains, feed efficiency, dressing percentages, and digestibility or availability of the major nutrients (DM, fiber, protein, energy). Response to CM substitution was very favorable for all parameters, except for a depression in feed intake at the 50 percent level which caused a significant decline in 6-wk. body wt. Performance of birds fed with sweet potato, especially at the higher levels, was less satisfactory as compared with cassava and/or 50 percent maize. Supplementation with 0.1 percent lysine and 0.1 percent met. further improved DM digestibility, crude fiber digestibility, ME, and metabolizable protein of cassava-based rations. (AS (extract))

0240

28342 OKEKE, G.C.; OJI, U.I.; UBA, F.N. 1986. Maize replacement values of cassava peels in the diet of growing rabbits. Beitrage zur Tropischen Landwirtschaft und Veterinarmedizin 24(2):221-226. En., Sum. En., De., Ru., Fr., Es., 8 Ref. [Dept. of Animal Science, Faculty of Agriculture, Univ. of Nigeria, Nsukka, Anambra State, Nigeria]

Cassava. Cortex. Rabbits. Feeds and feeding. Uses. HCN content. Detoxification processes. Drying. Silage. Dietary value. Animal nutrition. Nigeria.

In a feeding expt. with 48 growing New Zealand rabbits carried out for 56 days, maize was replaced by 15, 30, and 45 percent cassava peel meal. The addition of up to 30 percent meal from ensiled peels or 15 percent from sun-dried peels gave live wt. gains similar to those of the control group. From 30 percent on, sun-dried peel meal affected the feed uptake, and the content of SCN in the serum increased. Kidney wt., liver wt., and liver fat were also affected. Sun-dried cassava peel meal can be included up to 15 percent and ensiled cassava peel meal up to 30 percent into the feed ration, provided that the diet is sufficiently fortified with met. or fish meal. (AS)

0241

28179 OKEKE, J.E. 1986. Alternative uses of cassava in view of anticipated increased production. Umudike, Nigeria, National Root Crops Research Institute. 10p. En., Sum. En., 16 Ref. Paper presented at the 4th Joint NAFPP Workshop, Ibadan, Nigeria, 1986. [National Root Crops Research Inst., Umudike, Umuahia, Nigeria]

Cassava. Uses. Animal nutrition. Swine. Poultry. Cassava starch. Nigeria.

The importance of cassava in the domestic economy of Nigeria is examined in the light of a fluctuating production trend. Two alternative uses, as animal feed (swine and poultry) and as industrial starch, are described and their implications on fresh root supply are analyzed. A deficit in supply for human consumption exists while competition from animal feed and industrial starch imposes higher production targets. The potential of the crop assures adequate national output upon increased research support for efficient production technologies. (AS)

0242

26889 PIRIE, N.W. 1986. Cassava toxicity. Lancet 1(8480):561. En., 4 Ref. [Rothamsted Experimental Station, Harpenden, Herts AL5 2JQ, England]

Cassava. Toxicity. Detoxification processes. Cassava leaves (vegetable).

Wherever cassava is used as a main source of energy, it would be sensible to use the protein in the leaves. Evidence for 200 g of leaves/per capita eaten daily in Zaire is firm, and such an amount should supply 5-10 g protein daily. Despite the chronic fuel shortage in regions where cassava is grown, prolonged boiling is the usual method of removing HCN, but HCN and its precursors are soluble in water. There is no reason to think that more fuel would be used if the leaves were boiled briefly in a considerable vol. of water, squeezed by hand, and boiled again. The 2nd cooking water would be discarded also. Negligible HCN would probably remain, though this assumption needs exptl. verification. Minerals, vitamin C, and the B vitamins would be removed, but protein and beta-carotene (provitamin A) would remain in the boiled leaf. An alternative procedure would be pulping and pressing, and then curdling the expressed juice to make edible leaf protein. Unfortunately, yields from cassava leaves, taken when the tubers are harvested, have been smaller than from many other species of leaf. Perhaps cassava var. will be found from which leaf protein extraction is more satisfactory. As a result of encouraging feeding expt. in India, Nigeria, and Jamaica, leaf protein is now in small-scale but regular use in 5 or 6 countries. (Full text)

0243

26890 RAJANGAM, R.K.; VENKATAKRISHNAN, R. 1985. Metabolizable energy of thippi for poultry. Cheiron 14(5):278-279. En., 4 Ref. [Dept. of Animal Nutrition, Madras Veterinary College, Madras 600 007, India]

Cassava. Waste utilization. Feeds and feeding. Poultry. Food energy. Animal nutrition. India.

The ME value of thippi, a by-product of the cassava starch industry, was biologically assayed employing growing chicks and was found to be 120 kcal/g DM. (CIAT)

0244

26857 TEWE, O.O. 1985. Protein metabolism in growing pigs fed corn or cassava peel based diets containing graded protein levels. Research in Veterinary Science 38(3):259-263. En., Sum. En., 13 Ref. [Dept. of Animal Science, Univ. of Ibadan, Ibadan, Nigeria]

Cassava. Cortex. Uses. Swine. Proteins. Feeds and feeding. Animal physiology. Animal nutrition. Nigeria.

Sixty-four Largo White x Landrace weanling pigs were randomly allotted to 8 treatments in a 2 x 4 factorial arrangement. The 2 dietary variables were cassava peel (0 and 40 percent) and CP (20, 15, 10, and 5 percent). Total serum protein concn. was significantly (P less than 0.01) reduced by protein deficiency and by its interaction with cassava peel. The multiple coefficient of determination (R(2)) showed that protein intake was the primary factor determining changes in serum protein. R(2) values for cyanide intake (independent variable) on serum protein (dependent variable) increased from day 30 to 90 of the trial. Serum urea was increased on the 5 percent protein diets on days 60 and 90 of the trial. The R(2) values for cyanide and protein intake on serum urea concn. increased from day 30 to 90 of the trial. Serum creatinine increased (P less than 0.05) on the 5 percent protein diet on day 90 of the trial. The R(2) value for the effects of protein intake on serum creatinine was higher than for cyanide intake on days 30 and 90. The results confirm the progressive and pronounced effects of long-term cyanide intake on serum nitrogenous metabolites in pigs consuming between 110-120 ppm HCN, especially in diets containing 10 percent or less protein. (AS)

0245

27652 YUSOFF, S.M. 1985. Feeding value of palm kernel cake for growing heifers. Kajian Veterinar 17(1):49-54. En., Sum. En., Mal., 9 Ref. [Inst. Haiwan, Kluang, Johor, Malaysia]

Cassava. Cassava chips. Uses. Feeds and feeding. Animal nutrition. Supplements. Cattle. Malaysia.

A trial was conducted to determine the optimum combination of urea, cassava chips, and palm kernel cake in supplementary rations for growing Sahiwal-Friesian heifers. The rations were (1) 4 percent urea plus 94 percent cassava chips, (2) 3 percent urea plus 75 percent cassava chips plus 20 percent palm kernel cake, (3) 2 percent urea plus 56 percent cassava chips and 40 percent palm kernel cake, (4) 1 percent urea plus 37 percent cassava chips plus 60 percent palm kernel cake. These rations were given at 2 kg/animal/day to the animals with Pennisetum purpureum or Panicum maximum ad libitum. Animals given 4 percent urea in their feeds with no palm kernel cake performed the poorest in daily gain and feed efficiency. Heifers given up to 3 percent urea supplementation performed similarly well. It can be concluded that growing heifers need some protein supplementation in their daily rations for max. performance and are able to tolerate up to 3 percent urea supplementation in their rations. (AS) See also 0267 0289 0292 0322

H04 HCN Toxicity and Detoxification

0246

27606 AYERNOR, G.S. 1985. Effects of the retting of cassava on product yield and cyanide detoxication. Journal of Food Technology 20(1):89-96. En., Sum. En., 18 Ref., Il. [Dept. of Food Science & Technology, Univ. of Nigeria, Nsukka, Nigeria]

Cassava. Detoxification processes. Steeping. Cultivars. Starch content. Sugar content. Fiber content. Dry matter. Roots. Productivity. HCN content. Cyanides. Nigeria.

A traditional processing technique, referred to as retting, that effects cyanide detoxication in cassava products was investigated. Cassava retting is a technique of long soaking of cassava roots in water to effect the

breakdown of tissues and extraction of the starchy mass. A simulation of the technique, followed by sun drying, showed that loss of starch and soluble components caused an apparent rise in percent crude fiber in the products. The rise in percent fiber and root peel:pulp ratio showed an inverse relationship with product yield. The technique of retting followed by sun drying removed up to 98.6 percent of initial cyanide in the roots, the av. cyanide content of the product being 6.9 ppm; this is over 20-fold more efficient than simple sun drying. (AS)

I00 PROCESSING, PRODUCTS AND USES See 0199 0331 0344 0350

I01 Cassava Starch and its Properties

0247

27612 CEREDA, M.P. 1985. Avaliacao da qualidade da fécula fermentada comercial de mandioca (polvilho azedo). 1. Características viscográficas e absorcao de agua. (Quality evaluation of commercial fermented cassava starch. 1. Viscosity and water absorption characteristics). Revista Brasileira de Mandioca 3(2):7-13. Pt., Sum. Pt., En., 14 Ref., Il. [Depto. de Tecnología dos Produtos Agropecuários, Faculdade de Ciencias Agronomicas, Univ. Estadual de Sao Paulo, Campus de Botucatu, 18.600 Botucatu-SP, Brasil]

Cassava. Cassava starch. Fermented products. Viscosity. Analysis. Brazil.

Twelve samples of fermented cassava starch from traditional producing states of Brazil were analyzed to determine a quality index for the commercial product. Water absorption tests were carried out and the MC and Bostwick consistency of the pastes were determined. Brabender viscograms of pastes of 8 percent (wt./vol.) enabled the distribution of samples in 3 groups according to their rheological properties. The results were compared in order to find a water absorption index; this allows industrial yields in the confectionary products to be assessed. None of the analyses showed indexes of satisfactory correlation, or showed any relation to the production site. (AS)

0248

27611 CEREDA, M.P. 1985. Avaliacao da qualidade da fécula fermentada comercial de mandioca. 2. Características físico-químicas e absorcao de agua. (Quality evaluation of commercial fermented cassava starch. 2. Physical and chemical traits and water absorption). Revista Brasileira de Mandioca 3(2):15-20. Pt., Sum. Pt., En., 11 Ref. [Depto. de Tecnologia dos Produtos Agropecuários, Faculdade de Ciencias Agronomicas, Univ. Estadual de Sao Paulo, Campus de Botucatu, 18.600 Botucatu-SP, Brasil]

Cassava. Cassava starch. Fermented products. Analysis. Water content. Fiber content. Ash content. pH. Brazil.

Twelve commercial samples of fermented cassava starch from 3 traditional producer states of Brazil (Sao Paulo, Minas Gerais, and Paraná) were analyzed for moisture, fiber, ash, titrable acidity, and water absorption, in an attempt to provide an index to evaluate industrial yields. An easily determined parameter to water absorption was also sought. As a standard, the physicochemical results previously obtained with a fermented cassava starch that showed high water absorption and good biscuit yields were used. The analyses of variance showed high standard deviation and only titrable acidity and moisture were related to water absorption with low r values. Characteristics did not differ among sites. The only sample that showed 3 characteristics related to high industrial yields (water absorption, fiber, and titrable acidity) was no. 11 from Sao Paulo. (AS)

0249

27610 CEREDA, M.P.; BONASSI, I.A. 1985. Avaliacao da qualidade da fécula fermentada comercial de mandioca (polvilho azedo). 3. Acidos organicos e absorcao de água. (Quality evaluation of commercial fermented cassava starch. 3. Organic acids and water absorption). Revista Brasileira de Mandioca 3(2):21-30. Pt., Sum. Pt., En., 19 Ref., Il. [Depto. de Tecnologia dos Produtos Agropecuários, Faculdade de Ciencias Agronomicas, Univ. Estadual de Sao Paulo, Campus de Botucatu, 18.600 Botucatu-SP, Brasil]

Cassava. Cassava starch. Fermented products. Analysis. Brazil.

Twelve samples from 3 Brazilian states that traditionally produce fermented cassava starch were analyzed to determine a quality index for the commercial product. Essays of water absorption were made in a Brabender farinograph and the ratio of organic acids was determined by gas chromatography. Acetic, propionic, valeric, butyric, and lactic acids were found; isobutyric and isovaleric acids were not detected. The results varied greatly; however, lactic acid prevailed in the samples from Minas Gerais. In the samples from Sao Paulo and Paraná, the acids had a more proportional distribution, although lactic acid was prevailing, followed by acetic and butyric acids. All the samples showed significant correlation between the lactic and acetic or between the butyric and valeric acids. The water absorption essays showed no satisfactory correlation with any of the other analyses. The amount of organic acids seemed to be less important than its proportion in the samples. Among the 5 samples that showed water absorption values above 75 percent, 4 showed more than 90 percent lactic acid and less than 7 percent acetic acid. Under these conditions, the amount of lactic acid seemed to be a good index for evaluating water absorption capacity by fermented cassava starch. (AS)

0250

28145 CEREDA, M.P. 198[illegible] Determinacao da viscosidade em fécula fermentada de mandioca (polvilho [illegible]do). (Determination of viscosity in fermented cassava starch). Boletim da Sociedade Brasileira de Ciencia e Tecnologia de Alimentos 17(1):15-24. Pt., Sum. Pt., En., 10 Ref., Il. [Depto. de Tecnologia dos Produtos Agropecuários, Faculdade de Ciencias Agronomicas, UNESP, Caixa Postal 237, 18.600 Botucatu-SP, Brasil]

Cassava. Cassava starch. Fermented products. Viscosity. Analysis. Brazil.

A modification of the classical Mazurs method for the determination of the rheological properties of starch pastes was proposed for the determination of the characteristics of fermented cassava starch, known in Brazil as polvilho azedo. Properties determined using this modified method were compared with those reported in the literature. Concn. (dry wt./vol.) of 4, 6, 8, and 10 percent were used. Best results were obtained with a concn. of 8 percent with the max. temp. of 90 degrees Celsius maintained for 30 min. (AS)

0251

28147 CEREDA, M.P. 1983. Padronizacao para ensaios de qualidade da fécula de mandioca fermentada (polvilho azedo). 2. Ensaios de absorcao de água. (Standardization of quality tests for fermented cassava starch. 2. Water absorption tests). Boletim da Sociedade Brasileira de Ciencia e Tecnologia de Alimentos 17(3):297-304. Pt., Sum. Pt., En., 3 Ref., Il. [Facultad de Ciencias Agronómicas, Univ. Estadual Paulista, Campus de Botucatu, Caixa Postal 237, 18.600 Botucatu-SP, Brasil]

Cassava. Cassava starch. Fermented products. Analysis. Brazil.

The method used to determine water absorption for wheat flour (Brabender

farinograph) was modified so as to be applied to fermented cassava starch, known as polvilho azedo in Brazil. Two procedures were proposed, based on commercial methods, to make salty biscuits from this starch. The parameters used were previously obtained in commercial establishments. The water absorption as determined by lab. tests was compared with the vol. actually used in commercial formulations, using the same fermented cassava starch. Although both procedures were shown to evaluate water absorption by the starch, the one that used boiling water during the whole test showed results that were closer to the real values of water absorption. (AS)

0252

26896 SHIN, Y.C.; LEE, S.Y.; CHOE, Y.K.; KIM, H.S.; BYUN, S.M. 1986. Ethanol fermentation of cassava starch pretreated with alkali. Biotechnology and Bioengineering 28(4):627-630. En. [Dept. of Biological Science & Engineering, Korea Advanced Inst. of Science & Technology, P.O. Box 150, Chongryang, Seoul 131, Korea]

Cassava. Cassava starch. Uses. Ethanol. Fermentation. Timing. Analysis.

The effects of alkali steeping of starch and the structural changes of starch granules that take place during the process of ethanol fermentation are described. Ten g of 30-mesh particles of air-dried cassava were steeped in 40 ml of 0.2N NaOH at 50 degrees Celsius for 12 h and then enzyme treated. Subsequently, 0.5 g of compressed baker's yeast (Saccharomyces cerevisiae) and 8 mg of K2S2O5 (final concn. of 0.02 percent) were added to the mixture, and ethanol fermentation was carried out for several days at 30 degrees Celsius, after which the ethanol content of the broth was determined. The optimal alkali concn. for the pretreatment was 0.2N and the proper steeping time for increasing saccharification yield was 12 h. Steeping in 0.2N NaOH at 50 degrees Celsius for 12 h was found very effective. It was suggested that the alkali solution did not hydrolyze starch molecules but played an important role in the structural changes of starch granules. These changes were remarkably different between acid and alkali steepings. Alkali steeping produced a complete disruption of starch particles and this change depended heavily on time and temp. of exposure and on alkali concn. Max. ethanol production (93 percent) was achieved with the 0.2N treatment and 3-4 days of fermentation. (CIAT) See also 0255

I02 Uses, Industrialization, Processing and Storage

0253

28398 AJIBOLA, O.O. 1986. Desorption isotherms of gari from 40 degrees Celsius to 70 degrees Celsius. Journal of Agricultural Engineering Research 35(3):207-210. En., Sum. En., 8 Ref., Il. [Dept. of Agricultural Engineering, Univ. of Ife, Ile-Ife, Nigeria]

Cassava. Gari. Analysis. Water content. Processing. Nigeria.

Desorption equilibrium MC of gari were determined at 40, 50, 60, and 70 degrees Celsius over a range of RH from 11 to 82 percent. A nonlinear least squares regression program was used to fit 5 desorption isotherm models to the exptl. data. The min. standard error of estimate of equilibrium MC (0.7 percent) was obtained by using the Modified Halsey model. The min. standard error of estimate of equilibrium RH (4.3 percent) was obtained by using the Chen Clayton model. (AS)

0254

28149 BEST, R.; ALONSO, L.; LEON G., A. 1986. Procesamiento de la yuca para pequeños productores: adaptación y mejoramiento de una máquina picadora de yuca para el uso de cooperativas de agricultores. (Cassava processing for small farmers: adaptation and improvement of a cassava chipper for use by

farmer associations). Cali, Colombia, Centro Internacional de Agricultura Tropical. 20p. Es., Sum. Es., 10 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Small-scale processing. Small-scale equipment. Cassava chips. Colombia.

Research work carried out at the commercial plant level and at the exptl. level to improve the design and utility of the Thai-type cassava chipper is described. The evaluation of 3 other types of cassava chipper (Malaysian, Colombian, and Brazilian) is presented; they are compared in terms of their mechanical performance and the drying characteristics of the chips produced. It is concluded that the Thai-type cassava chipper can be used in the natural cassava drying plants of the Colombian Atlantic Coast. The Malaysian- and Brazilian-type chippers did not offer advantages as to greater capacity, lower costs, or greater dehydration efficiency. The Colombian-type blade can be easily adapted to the existing chippers; the drying efficiency would be improved due to the more uniform chips. (CIAT)

0255

27609 CEREDA, M.P.; BONASSI, I.A.; BRASIL, O.G.; MATSUI, E. 1985. Ensaios de fermentacao da fécula de mandioca em diferentes condicoes de cultivo. (Fermentation of cassava starch under different cultivation conditions). Revista Brasileira de Mandicoa 3(2):69-81. Pt., Sum. Pt., En., 22 Ref., Il. [Depto. de Tecnologia dos Produtos Agropecuários, Faculdade de Ciencias Agronômicas, Univ. Estadual de Sao Paulo, Campus de Botucatu, 18.600 Botucatu-SP, Brasil]

Cassava. Cassava starch. Fermentation. Fermented products. Analysis. Brazil.

It was confirmed that starch fermentation occurs in both open and closed conditions. In open conditions, O content was reduced, favoring microaerobic conditions the 1st days. In essays conducted with sterile substrates, both conditions produced natural fermentation. In closed conditions, it was possible to measure and identify the gases. Gas production was greater in shake cultures than in non-shake ones, but in both the composition changed along the fermentation process (17 days). High correlation values were found for H2/N2, H2/CO2, N2/CO2, N2/O2, and N2/Ar. Acetic, propionic, isobutyric, and valeric acids were found; no lactic acid was detected. Total acidity was higher in open than in closed expt. and in shake than in non-shake ones. In 40 day-fermentation, the pH value fell from an av. value of 6.20 (initial) to 3.20 (final). The av. titritable acidity value was 0.02 ml NaOH N/100 ml and the final value from the open expt. was about twice that of the closed one. The initial reducing sugar values (expressed as mg glucose/100 ml) had an av. of 2.25 mg and at the end of the fermentation process, it was undetectable. It seems that atmosferic N can be fixed by microorganisms present in cassava starch fermentation. (AS)

0256

28144 CEREDA, M.P. 1985. Use da fécula de mandioca como matéria-prima alternativa na fabricacao da cerveja. (Use of cassava starch as an alternative raw material for beermaking). Revista Brasileira de Mandioca 4(1):117-122. Pt., Sum. Pt., En., 9 Ref., Il. [Facultad de Ciencias Agronómicas, Univ. Estadual Paulista, Campus de Botucatu, Caixa Postal 237, 18.600 Botucatu-SP, Brasil]

Cassava. Cassava starch. Uses. Beverages. Fermentation. Analysis. Brazil.

The proposal for substituting alternative raw materials, such as cassava

starch, for the barley malt used in beermaking, is analyzed. In one process the starch is saccharified by Discorea dumetorium amylases and the must is aromatized with hop and fermented by traditional agents. Cassava can also be used as malt complement (15-20 percent of total malt) followed by traditional blending. The use of fresh roots has the inconvenience of low postharvest conservation; this problem can possibly be overcome by substituting the cassava starch for malt complements. Good results are possible since turbidity and off-taste of the finished beer are avoided. (AS)

0257

26146 CEREDA, M.P. 1983. Padronizacao para ensaios de qualidade da fécula de mandioca fermentada (polvilho azedo). 1. Formulacao e preparo de biscoitos. (Standardization of quality tests of fermented cassava starch. 1. Biscuit recipes and preparation). Boletim da Sociedade Brasileira de Ciencia e Tecnologia de Alimentos 17(3):287-295. Pt., Sum. Pt., En., 7 Ref., Il. [Depto. de Tecnologia dos Productos Agropecuarios da Faculdade de Ciencias Agronomicas, Univ. Estadual Paulista, Campus de Botucatu, Caixa Postal 237, 18.600 Botucatu-SP, Brasil]

Cassava. Cassava starch. Fermented products. Uses. Biscuits. Bakery products. Brazil.

A standard recipe was used for making fermented cassava starch biscuits in order to evaluate the quality of the commercial product. The stages of preparation, the type and material of the cookie sheets, and the shape of the biscuit were also standardized. The dough was prepared with fermented cassava starch and cassava starch acidified with acetic acid. The 1st dough showed the ideal firmness for biscuit-making but the second, in spite of having been prepared in the same way as the 1st, showed a semiliquid consistency and could not be molded. (AS)

0258

28137 CEREDA, M.P.; BRASIL, O.G.; FIORETO, A.M.C. 1981. Microrganismos com respiracao resistente ao cianeto isolados de líquido residual de fecularia. (Microorganisms with cyanide-resistant respiration, isolated from cassava flour industrial wastes). Phyton (Argentina) 41(1-2):197-201. Pt., Sum. En., 8 Ref.

Cassava. Biochemistry. Cassava starch. Factories. Wastes. Analysis. Brazil.

Two yeasts and 2 bacteria with cyanide-resistant respiration were isolated from CF industrial waste. The respiration measurements of the whole cells were carried at 30 degrees Celsius in a biological oxygen monitor equipped with a Clark-type oxygen electrode. KCN was the cytochromic path inhibitor and salicylhydroxamic acid was the cyanide-resistant respiration inhibitor. The yeasts found belonged to the genus Trichosporon (T. cutaneum and T. penicillatum). (AS)

0259

26858 KWATIA, J.T. 1986. Cassava: storage, processing and utilization. Ibadan, Nigeria, International Institute of Tropical Agriculture. 34p. En., 20 Ref., Il. Paper presented at IITA-UNICEF Consultation the Promotion of Household Food Production and Nutrition, Ibadan, Nigeria, 1986.

Cassava. Small-scale processing. Small-scale equipment. Drying. Cassava flour. Costs. Factories. Labor. Socioeconomic aspects. Prices. Africa.

The prospects for the successful storage, processing, and utilization of cassava in African countries are analyzed. The present indigenous processing technologies available to prevent postharvest losses are

described regarding drying and dry products (CF) with or without fermentation, products based on fermented cassava dough (e.g., gari), and minor processing tecnologies (e.g., starch and tapioca). The major problem in the production of CF and gari using traditional methods is the absence of improved technology for drying the chipped or rasped material. Improved drying technologies are briefly described and illustrated. These include solar dryers and convection dryers. The expansion of cassava utilization to nontraditional areas is discussed. Its use for human consumption, animal feed, and industrial products is considered. The use of cassava through introduction of improved technologies into the informal industrial sector and the role women play in this process are discussed. A case study of small-scale CF production in Ghana is described. Recommendations are given pertaining to cassava processing and utilization in the main cassava-producing countries in Africa. (CIAT)

0260

26886 NEHRU, C.R.; JAYARATHNAM, K. 1985. Field evaluation of some granular insecticides against the Indian mole rat, Bandicota bengalensis Gray. Planter 61:172-175. En., Sum. En., 10 Ref. [Plant Pathology Division, Rubber Research Inst. of India, Kottayam, 686 009, Kerala, India]

Cassava. Uses. Pest control. India.

An acceptable degree of control of mole rats (Bandicota bengalensis) in rubber plantations near Kottayam, India, was easily achieved by baiting stable and weather-resistant granular insecticides with tapioca. Broadcasting of granular insecticides in and around burrows or runways was less effective. Aldicarb was the most effective of the 5 chemicals tested; B. bengalensis activity was reduced by 98.33 percent after a single application. In view of the toxicity of this insecticide, baiting with tapioca should be done in such a way as to reduce the greater hazard to domestic animals. Carbofuran with tapioca was also effective (85.00 percent) in reducing rat population. (CIAT)

0261

27648 OHOCHUKU, N.S. 1985. Deodorization of fermented cassava. Journal of Agricultural and Food Chemistry 33(2):220-222. En., Sum. En., 9 Ref. [College of Education, P.M.B. 5047, Port Harcourt, Nigeria]

Cassava. Foofoo. Fermentation. Organoleptic examination. Deodorizing. Processing. Nigeria.

A method to remove the odor from fermented cassava roots, so as to popularize their consumption in Nigeria, is discussed. The hydrogen peroxide-treated mass could be dried to give CF with a longer shelf life that could be used in times of need. The net effect would be an overall increase in cassava fufu consumption and a drive toward mechanized production of this odorless CF. The use of alkali and carotenoids is also discussed. (CIAT)

0262

28119 ORIAS JUNIOR, R.R. 1986. Technoguide on village level processing of cassava into chips, flour and starch. Baybay, Leyte, Philippines, Philippine Root Crops Information Service. 16p. En., Il.

Cassava. Small-scale processing. Small-scale equipment. Cassava chips. Drying. Technology. Philippines.

A technical guide, especially for cassava farmers, of the basic steps involved in cassava processing together with the newly-developed processing tools and equipment and their operation is presented. The different

processing operations for chips are described, namely washing, peeling, and chipping (manual or mechanical). Three types of chippers (hand-operated, pedal-operated, and engine-powered) and the use of direct sun drying or different types of dryers (solar with supplemental heating, modified Copra, and a batch-type) are described. The storing of dried chips is briefly indicated. The grinding and sieving stages of CF making are mentioned and the steps for manual and mechanical (pedal or electric) starch extraction are given. Recommendations for the quality control of cassava products at the farm level are given. (CIAT)

0263

23158 OSPINA P., B. 1982. Informe de actividades en la planta piloto de secado natural de yuca San Juan de Betulia - Sucre. (Activity report on the cassava natural drying pilot plant in San Juan de Betulia - Sucre). In Centro Internacional de Agricultura Tropical. 1982. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la costa norte de Colombia; producción y procesamiento de yuca en el Departamento de Sucre. Primer informe noviembre 1981-junio 1982. Cali, Colombia, Proyecto Cooperativo DRI/ACDI-CIAT. 13p. Es., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Factories. Drying. Costs. Cassava programs. Labor. Productivity. Colombia.

The activities of the cassava natural drying pilot plant in Betulia (Sucre, Colombia), from Nov. 1981 to June 1982, are reported. The plant, which began operations in Feb. 1982, has processed 100.9 t fresh roots to produce 38.3 t dry chips. The Thailand-type chipper has processed an av. of 1300 kg fresh roots/h. If a concrete drying floor of 300 square meters and a load of 10-12 kg/square meter are used, 50 h of continuous drying are required to dry cassava chips to 13-14 percent MC. A total of 26.8 man-h are required to process (chipping, spreading, turning over, and collection) a 3.6 t-batch. Other variable costs are briefly analyzed. The quality (MC and physical appearance) of the dry chips after 1 mo. of storage is considered satisfactory. Future activities are discussed. (CIAT)

0264

26764 PANGARSO, D.; RACHMAN, A.; SARASWATI. 1985. Peranan industri alkohol di Jawa Timur. (The role of alcohol industry in East Java). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.97-106. In., Sum. In., En.

Cassava. Alcohol. Economics. Factories. Costs. Productivity. Trade. Prices. Indonesia.

To date alcohol industries in Indonesia do not use modern technology, resulting in an inefficient use of raw material, lower productivity, and higher processing costs. Sugarcane waste (tetes) has been used as raw material for alcohol industries in East Java since it does not require other products and its cost is relatively low. The use of cassava as raw material for alcohol production is still difficult since it requires extra processing and its cost is also higher. Provided these problems are solved, cassava would be a preferable raw material for alcohol production. (AS)

0265

26159 PETERSIME INDUSTRIAL S.A. BRASIL. s.f.. Multitriturador MIBO. (MIBO multitriturator). Urussanga-SC, Brasil. 2p. Pt., Il.

Cassava. Grinding. Small-scale equipment. Brazil.

The technical characteristics and products that can be prepared for animal feeding by the MIBO multitriturator are presented. Cassava products that can be obtained are chopped roots for direct feeding or silage, chopped stems for direct feeding, and chips for silage or sun drying. (CIAT)

0266

24087 PINTO S., R.; OLAZABAL B., M.; MORA J., G.E. 1980. Estudio de factibilidad para la instalación de una planta de extracción de almidón de yuca en el Distrito Sur Guajira. (Feasibility study for the establishment of a cassava starch extraction plant in South Guajira district). Tibaitatá, Colombia, Instituto Colombiano Agropecuario. Documento de Trabajo no.00-6-106-81. 146p. Es., Sum. Es., Il.

Cassava. Factories. Starch productivity. Industrial machinery. Marketing. Costs. Prices. Cultivation. Distribution. Statistical data. Maps. Colombia.

A detailed feasibility study for the establishment of a small, sweet and bitter cassava starch extraction plant in South Guajira district, Colombia, is presented. After a thorough analysis of cassava production problems, marketing, and potential in the region, an economic analysis was made for a plant of 2500 square meters and its equipment, which can produce 78 t cassava starch (45 t bitter starch for bakery purposes and 33 t sweet starch for industrial purposes). The av. starch extraction efficiency was estimated to be 63 percent. The gross income return was estimated to range between 13.6-18-2 percent, depending on the rate of interest. The technical processes involved are described. (CIAT)

0267

26302 RANGEL M., R.E.; RUEDA P., C.C. 1984. Evaluación económica y bondades nutritivas de la yuca para el montaje de una planta procesadora de harina para alimentos concentrados. (Economic evaluation and nutritional qualities of cassava to establish a cassava meal/processing plant for animal concentrates). Tesis Ing. Industrial. Bucaramanga, Colombia, Universidad Industrial de Santander. 236p. Es., 14 Ref., Il.

Cassava. Nutritive value. Economics. Factories. Socioeconomic aspects. Labor. Costs. Prices. Cassava meal. Production. Cultivation. Root productivity. Pressing. Drying. Grinding. Screening. Colombia.

The economic feasibility of establishing a CM processing plant for animal concentrates in Santander, Colombia, was evaluated. The technical aspects of cassava production and crop availability in the region are reviewed and the results of a survey to identify the best localization for plant are given. A tentative design of the plant is presented. Aspects covered by the project include the present status of cassava in the region, existing infrastructure, markets, processing plant organization and management, CM production process and equipment, and commercialization. The social, technical, and economic benefits of establishing the project are evaluated. Blueprints are included. (CIAT)

0268

27626 REEVES, J. 1985. Cassava drying industries; new potential for the Caribbean. Caribbean Farming. November 1985:15-17. En., Il.

Cassava. Drying. Industrialization. Small-scale processing. Caribbean. Colombia.

The evolution of cassava drying industries on the northern coast of Colombia, as a result of a joint effort of CIAT/Colombian agencies, is discussed; projections for other Caribbean countries are included. It is stressed that the establishment of a cassava drying pilot plant would yield

real data to determine the feasibility of a large-scale project. Cassava potential in Jamaica is briefly analyzed. (CIAT)

0269

26855 ROSARIO, R.R. DEL; MALIT, P.B. 1984. Improved ubi (Dioscorea alata Linn.) flour preparation and its utilization for instant halaya. Philippine Agriculturist 67(2):177-182. En., Sum. En., 2 Ref.

Cassava. Processed products. Cassava starch. Food products. Philippines.

Different methods of yam flour preparation were studied. Utilization of yam flour for the development of instant halaya, a traditional flour preparation in the Philippines, was also studied. Instead of stirring the mixture, which is the traditional method of preparation, oven baking was employed. Addition of 5, 10, and 15 percent cassava starch was evaluated to determine its effect on the texture, flavor, and general acceptability of the product. Results showed that baking could replace the traditional method in the preparation of halaya. Addition of 5 percent cassava starch could improve the texture and general acceptability of the final product.(AS)

0270

26770 TEDJO, E.M. 1985. Pemanfaatan pati ubi kayu, ubi jalar dan bote sebagai bahan dasar industri maltosa, glukosa dan tepung oksidasi. (Use of cassava, sweet potato, and cocoyam starches as raw materials of maltose, glucose, and modified starch industries). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.173-180. In., Sum. In., En., 5 Ref..

Cassava. Starch content. Maltose. Glucose industry. Sweet potatoes. Cocoyams. Root productivity. Enzymes. Indonesia.

The rates of conversion of cassava, sweet potato, and cocoyam starches into maltose are about 97.0, 90.1 and 89.4 percent, resp.; into glucose, about 90.0, 86.4, and 84.4 percent, resp.; and into modified starch, about 100.0, 98.8, and 100.0 percent, resp. The above rates of conversion are affected by the kind of tuber, method of processing, and quality control. Starch contents for cassava, sweet potato, and cocoyam range from 20 to 22, 14 to 17, and 20 to 24 percent, resp. An enzymatic method of processing was used for maltose and glucose, and a chemical process for modified starch. Quality control of maltose and glucose depends on the Ds, De, and pH and on the time of fermentation, whereas quality control of modified starch depends on the viscosity.(AS)

0271

27691 UNITED NATIONS DEVELOPMENT ORGANIZATION. 1985. Making cassava a safer food. Agricultural Information Development Bulletin 7(3):15-18. En., Sum. En., Il. Also in Development Forum, September 1985.

Cassava. Human nutrition. Fermentation. Drying. Detoxification processes.

The different ways of making cassava a safer and nutritionally richer product for human consumption are discussed, based on the recommendations given by a committee of the United Nations Industrial Development Organization. Further research is required on gari production to produce a safer, HCN-detoxified, and protein-rich cassava food. (CIAT)

0272

26804 ZERDA O., M.E. 1974. Planos para trizadora y pulverizadora para la producción de almidón a partir de la yuca. (Diagrams of a shredding and

pulverizing machine for cassava starch production). Bucaramanga, Colombia, Universidad Industrial de Santander. Proyecto no.1415.D.A. Es., Il. Contiene 6 planos.

Cassava. Cassava starch. Industrial machinery. Developmental research. Colombia.

Six diagrams corresponding to a project for cassava starch production are presented. The mechanical design, no., and name of the different parts and the amount of material needed for the manufacture of a shredding and pulverizing machine (hammer mill) are given. (CIAT) See also 0213 0233 0241 0246 0252 0275 0282 0294 0302 0303 0313 0314 0316 0318 0320 0321 0322 0326 0327 0328 0330 0332 0333 0337 0338 0339 0341 0343 0345 0348 0352 0359 0363 0372 0373

I03 Industrial Microbiology

0273

25785 FLOREZ, P.; GARCIA G., H. 1979. Obtención de acetona y butanol por fermentación a partir de la yuca. (Acetone and butanol production through cassava fermentation). Tesis Ing. Químico. Bucaramanga, Colombia, Universidad Industrial de Santander. 204p. Es., 28 Ref., Il.

Cassava. Enzymes. Starch productivity. Energy productivity. Hydrolysis. Industrial machinery. Sugar content. Storage. Drying. Diseases and pathogens. Waste utilization. Colombia.

Acetone and butanol were produced by fermentation using cassava as raw material. With a modern system used in Brazil, cassava starch extraction yielded an av. 85 percent efficiency. The optimal conditions for starch hydrolysis were as follows: time, 60 min; pH, 4.6; temp., 64 degrees Celsius; starch concn., 48 g/liter; malt concn., 24 g/liter. Under these conditions an av. yield of 83.5 percent was obtained regarding hydrolyzed sugar over the total sugar theoretically expected. The following optimal conditions were established for the fermentation process using Clostridium acetobutylicum: time, 49 h; temp., 31 degrees Celsius; sugar concn., 9 percent (on a wt. basis); pH, 5.15-5.65 (variable over time). A 29.6 percent yield (total solvent wt. over total wt. of sugar used) was obtained under these conditions. From the distillation process, acetone was obtained at a 92.86 percent concn. and butanol at an 89.86 percent concn. Cassava production, starch extraction, fermentation, and waste utilization are reviewed in detail. (CIAT)

0274

26703 FUJIO, Y.; OGATA, M.; UEDA, S. 1985. Ethanol fermentation of raw cassava starch with Rhizopus koji in a gas circulation type fermentor. Biotechnology and Bioengineering 27(8):1270-1273. En., Sum. En., 10 Ref., Il. [Dept. of Food Science & Technology, Faculty of Agriculture, Kyushu Univ., 6-10-1 Hakosaki Fukuoka, 812, Japan]

Cassava. Ethanol. Fermentation. Cassava starch. Industrial machinery. Industrial microbiology. Hydrolysis. Japan.

The results of a study to characterize ethanol fermentation of raw cassava starch with Rhizopus koji in a gas circulation-type fermenter are presented. Ethanol concn. reached 13-14 percent (vol./vol.) in a 4-day broth and max. ethanol productivity was 2.3 g ethanol/liter broth/h (approx. 50 percent the productivity of a glucose-yeast system). Ethanol yield ranged from 72.3 to 83.5 percent of the theoretical yield for the cassava starch used. The fermenter used proved to be suitable for ethanol fermentation of the broth with a solid substrate. (AS)

0275

26811 RAIMBAULT, M.; REVAH, S.; PINA, F.; VILLALOBOS, P. 1985. Protein enrichment of cassava by solid substrate fermentation using molds isolated from traditional foods. Journal of Fermentation Technology 63(4):395-399. En., Sum. En., 25 Ref. [Univ. Autonóma Metropolitana, Depto. de Biotecnología, Apartado Postal 55-535, 09340, México D.F., México]

Cassava. Protein enrichment. Fermentation. Aspergillus. Protein content. Analysis. Industrial microbiology. Feeds and feeding. Mexico.

The possibility of using fungal strains isolated from Mexican, African, and Oriental traditional foods to upgrade the protein content of cassava by solid state fermentation was investigated. From the 32 strains which were initially selected for their ability to use starch, only 24 had observable growth at 30 degrees Celsius after 24 h. On the basis of protein yield and conversion rate of starch, 20 strains that used over 70 percent of the carbohydrate and produced over 2 g of protein/liter were selected. When assayed for solid state fermentation, 2 strains showed no detectable growth but most of the other 18 strains could grow well on cooked cassava. Protein content of enriched cassava varied from 10.9 to 16.5 percent and residual sugars content from 28.2 to 45.2 percent. Eleven of these strains increased the protein content to greater than 14 percent. (Journal of Fermentation Technology)

0276

26825 RUSSELL, I.; CRUMPLEN, C.M.; JONES, R.M.; STEWART, G.G. 1986. Efficiency of genetically engineered yeast in the production of ethanol from dextrinized cassava starch. Biotechnology Letters 8(3):169-174. En., Sum. En., 9 Ref., Il. [Production Research Dept., Labatt Brewing Company, P.O. Box 5050, Stn A., London, Ontario, Canada N6A 4M3]

Cassava. Ethanol. Cassava starch. Saccharomyces diastaticus. Enzymes. Biochemistry. Canada.

The ability of a polyploid/aneuploid Saccharomyces diastaticus x heroplast fusion product and a diploid S. diastaticus hybridization product to produce ethanol from dextrinized cassava starch with varying amounts of supplemented glucoamylase (amyloglucosidase) was investigated. It was found that the added glucoamylase could be reduced by over 50 percent using these glucoamylase-producing strains as compared with a commercially available S. cerevisiae strain commonly used in ethanol-producing industries. (AS)

0277

26892 SMITH, R.E.; OSOTHSILP, C.; BICHO, P.; GREGORY, K.F. 1986. Improvement in the protein content of cassava by Sporotrichum pulverulentum in solid state culture. Biotechnology Letters 8(1):31-36. En., Sum. En., 15 Ref., Il.

Cassava. Protein enrichment. Dried roots. Biochemistry. Fermentation. Processed products. Sporotrichum pulverulentum. Canada.

Milled dry cassava roots were supplemented with a mineral salts solution of high ionic strength, and fermented with Sporotrichum pulverulentum in solid state culture. The fungus produced 30.4 g high quality protein/100 g dry cassava in 48 h at 45 degrees Celsius in an aerated bench scale tray fermenter designed for this purpose. (AS)

0278

27664 YONGSMITH, B.; TABLOKA, W. 1985. (Food colors fermentation from cassava by Monascus sp.). Kasetsart Journal 19(1):45-50. Thai., Sum. En., Thai., 10 Ref., Il.

Cassava. Cassava starch. Monascus. Industrial microbiology. Fermentation. Thailand.

Seventy isolates of the genus Monascus from various sources were cultivated in malt-yeast extract to check their ability to produce extracellular pigments. Three isolates capable of good production of extracellular pigments were then selected for their ability to use cassava starch as a C source in both submerged and solid-state conditions. Red-color quality of the pigment was stable when pH ranged from 4 to 11 and temp. from 0 to 100 degrees Celsius. The toxicity test of color elements on fertile chicken eggs was negative. Heavy metals such as Cr, Hg, or Pb were negative in the coloring filtrate. (AS)

J00 ECONOMICS AND DEVELOPMENT

0279

24740 ADAPTIVE AGRICULTURAL RESEARCH ON SMALL SCALE CASSAVA AND RICE CULTIVATORS IN THE DOMINICAN REPUBLIC. 1984. Annual Report 1983. Netherlands, Wageningen Agricultural University. 43p. En., Sum. En.

Cassava. Developmental research. Cassava programs. Socioeconomic aspects. Rice. Erosion. Planting. Harvesting. Timing. Labor. Prices. Dominican Republic.

In 1983 a sample survey was designed to test preliminary conclusions based on diagnostic case studies among 65 informants, located through an informant selection survey in 1981. The sample survey was done in the same areas of Moca, Monción, El Pozo de Nagua, and Laguna Salada (Dominican Republic), in collaboration with Wageningen Agricultural U. and the Dominican State Secretariat of Agriculture or farmers' organizations. Cassava cultivators were found to face 3 basic problems: soil deterioration (erosion), root deterioration (root rot), and fluctuating prices. They have adapted to these problems by engaging in a low input, low risk cultivation system based on a series of var. that best fit the changing production conditions. The data support the hypothesis that cassava cultivators do experiment with new var.: about half of them had tried a new var. within the past 5 yr. Similar data is given for rice cultivators. Erosion trials indicated that the best solution for hill-farmers may be strip cropping with wide strips of natural growth. On the basis of CIAT recommendations, new trials were designed. Existing recommendations based on drainage canals or on narrow strips cultivated with special grasses or crops are not likely to reduce erosion; some recommended practices may even increase it. Research results were transmitted to farmers, extension workers, and researchers through an intensive dissemination program. (AS (extract))

0280

26304 ASESORES TECNICO-FINANCIEROS LIMITADA. COLOMBIA. 1980. Estudio de mercado para productos industriales derivados de la yuca. (Market study for industrial cassava by-products). Bogotá, Central de Cooperativas de Reforma Agraria. 63p. Es., 8 Ref.

Cassava. Processed products. Trade. Dried roots. Cassava flour. Cassava starch. Glucose. Cassava meal. Consumption. Prices. Fresh products. Cassava roots (vegetable). Wastes. Feeds and feeding. Legal aspects. Paper industry. Glucose industry. Production. Colombia.

The results of a survey in Bogota, Cali, Medellin, and Barranquilla (Colombia) on the supply and demand of industrial cassava by-products are presented. A total of 212 industries that consume cassava by-products were surveyed: 22 feed industries, 27 confectioneries, 49 glue industries, 11 bread-making industries, and 86 textile industries. A description, use,

quality required by industries, suppliers, price, demand, and supply are given for CM, glucose, starch, dry cassava, and cassava bran. Data are given on the vol. and costs of fresh cassava to produce 1 t of each as well as the estimated amounts of cassava required according to the estimated demand: 50,560 t fresh cassava for CM; 33,967 t for cassava starch; 18,428 t for glucose, and 27,224 t for dry cassava. (CIAT)

0281

26797 ATO, B.F.; TOLOYE, M.J. 1985. Expose de la delegation Centrafricaine. (Report on Central African Republic). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.172-181. Fr.

Cassava. Production. Marketing. Processing. Prices. Postharvest losses. Socioeconomic aspects. Cassava programs. Developmental research. Legal aspects. Central African Republic.

The situation of root and tuber crops in the Central African Republic is described. In this country, 80 percent of the population is engaged in agriculture and food shortages exist due to the presence of groups of refugees. Root and tuber crops are of primary importance in drought-stricken regions, especially in southern Sahara. Cassava is cultivated throughout the country and it is processed as gari, foofoo, chips, flour, and chickwangue; it is also used as animal feed. No regulated commercialization system for roots and tubers exists; generall, the commerce of these products is the women's responsibility (Gali wala), characterized by faulty organization, control of small vol. (except in the case of cassava chips), and nonpromotion of production. Unscheduled harvests, lack of credit and of trustworthy processing systems are other constraints. Shifting cultivation is also practiced and there is a high incidence of pests and diseases. Some research works are described. (CIAT)

0282

26796 BADIRU, M.A.; SOFELA, A.O. 1985. Situation of roots, tubers and plantains in Nigeria. In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.139-171. En., 33 Ref., Il.

Cassava. Socioeconomic aspects. Marketing. Prices. Processing. Processed products. Cassava flour. Foofoo. Postharvest losses. Production. Mechanization. Plant breeding. Cultivars. Statistical data. Legal aspects. Nigeria.

Data are presented on the role of root and tuber crops and plantain in Nigeria. Cassava is cultivated throughout the country, with an approx. annual output of 10.1-11.0 million t and an estimated yield of 9.16 t/ha. It is the major source of carbohydrates (mainly as gari) and is also used for animal feed as well a. in the textile industries and in the manufacture of alcohol. Cassava goes directly from the producer to the processor and thence to salesmen, retailers, wholesalers, and consumers. In 1981, 7.7 million t of cassava were commercialized and 2.75 million t were stored, with substantial losses during storage and transportation. Current research is described and the improved var. released to date are presented: U/41044, NR 7706, NR 7797, NR 7708, TMX 30211 y MMX 30555; a method for rapid multiplication of planting material, several machines, and development activities are also described. (CIAT)

0283

26836 BASLER, A. 1984. Kann Zaire sich selbst ernahren?. (¿Can Zaire feed itself?). Afrika Spectrum 19(3):231-252. De., Sum. En., Fr., 30 Ref. [Inst. fur Landwirtschafliche Marktforschung der Bundesforschungsanstalt fur Landwirtschanft, Bundesallee 50, 33 Braunschweig, German Federal Republic]

Cassava. Developmental research. Production. Productivity. Marketing. Statistical data. Consumption. Zaire.

Food production and marketing patterns and problems in Zaire are analyzed. Food production has increased slowly over the past 20 yr; however, Zaire needs to import agricultural products to feed her population. Such imports from the industrialized countries are paid for through the production of export crops (e.g. coffee) and raw materials (Cu) or by incurring more debts. After high increases of foreign export earnings in 1977-78, export trade has slumped, while food imports continued to increase so that the trade surplus had turned into a deficit by 1981. Land availability cannot be a roason for food deficits in Zaire, as large areas remain uncultivated. Small farm sizes, lack of mechanization, and traditional producer behavior are limiting factors; however, the existing inefficiencies of the marketing system are more important, especially regarding cassava. (AS)

0284

26724 BINONGO, M.S.G. 1985. An economic analysis of the demand for fresh cassava and cassava products in the Philippines. M.Sc. Thesis. College, Laguna, University of the Philippines at Los Baños. 194p. En., Sum. En., 43 Ref., Il.

Cassava. Economics. Trade. Costs. Prices. Fresh products. Processed products. Cassava starch. Food products. Feed mixtures. Philippines.

The current and potential demand for cassava roots in the Philippines was studied. Three potential markets for cassava were included in the analysis: food, feed, and the starch market. The results of the food demand analysis show that cassava root consumed as food is an inferior good, with an income elasticity estimate of -0.82. Rice and cassava roots were found to be substitute goods as indicated by the positive cross-price elasticity coefficient. The elasticity coefficient of cassava use with respect to the price of rice was 1.18. The results of the seasonal price variation analysis also show that rice and cassava are substitutes. A high seasonal index for cassava price was observed during rice off-season months, suggesting that more cassava is consumed when rice is scarce. The inclusion of dried cassava in mixed feeds is only possible if the price of cassava is very much lower in relation to the price of maize than has been the case in the past. The price of protein sources is also a prime determinant since more protein sources are required if cassava is included in feed rations. Regularity of cassava supply should also be considered because shifting feed mix involves cost. If supply is not regular, feed millers prefer not to use cassava, even if it is relatively cheaper. The market potential for starch looks good. Cassava starch consumption has increased faster than that of maize starch. A fall in the price of cassava relative to maize increases the share of cassava starch to total starch supply. Cassava starch production is also very responsive to cassava root price decline as shown by the value of the elasticity estimate (-1.77) for cassava root price and starch production. The results of the analysis suggest that the potential demand for cassava roots in the future will depend on relative price changes of cassava and other feed ingredients, income growth, reduction in the cost of production, and improved regularity of supply. (AS)

0285

26146 BODE, P.; JANSSEN, W. 1984. Factores que influyen en la organización de agricultures DRI en asociaciones de productores. (Factors influencing the organization of farmers participating in the Integrated Rural Development (DRI) program into producer associations). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.72-77. Es.

Cassava. Production. Socioeconomic aspects. Developmental research. Cassava programs. Colombia.

The results of a case study conducted in Betulia (Sucre, Colombia), in which the criteria for effective organization of cassava producers were determined, are summarized and discussed. Among the factors that affect the farmers' decision to associate, the form of land tenancy and access to credit are important. The cohesion of farmer associations for cassava drying is determined by (1) the fact that the association truely offers its members the advantages that induced them to associate (e.g., purchase of their product, work during the dry season, credits, profits for the association); (2) the formal organization of the association (frequent meetings to maintain the interest of its members and to convince them that the future of the plant depends on themselves); and (3) institutional advise (training). (CIAT)

0286

23081 BODE, P. 1984. Peasant cooperation: a self-interested behavior. An analysis of three peasant-associations in North Colombia. Amsterdam, University of Amsterdam. 83p. En., Sum. En., Nl., 40 Ref., Il.

Cassava. Socioeconomic aspects. Economics. Harvesting. Weeding. Labor. Cassava programs. Marketing. Production. Intercropping. Colombia.

Three cassava drying peasant associations in northern Colombia were studied to determine the factors affecting membership and the importance of leadership. Peasant agriculture in San Juan de Betulia (Sucre) is described and the cassava producer associations of Betulia, Albania, and Zacateca are analyzed. A cost:benefit analysis indicated that the decision of peasants to join cassava drying associations depends primarily on the benefits which individual peasants get from solving the cassava marketing problem. Likewise, the decision to show solidarity and loyal behavior within the association plays a major role. Leadership in theory and practice is discussed. Peasant organizations would be more successful if they were guided by representative leaders supported by the members and who would try to further peasants' interests. (CIAT)

0287

26143 BOERING, S.; JANSSEN, W. 1984. La competencia por la tierra entre la agricultura y la ganadería en el minifundio costeño. (Competition for land for farming and cattle raising on small coastal farms). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.51-57. Es.

Cassava. Cattle. Production. Land use. Intercropping. Socioeconomic aspects. Economics. Root productivity. Developmental research. Cassava programs. Colombia.

The results of a case study conducted in Betulia (Sucre, Colombia) in May-

Dec. 1983 to evaluate the competition for land between cassava cultivation (monocropped or in association with maize or yam) and cattle raising are discussed. In general, profits from cassava either in association or in monoculture are much higher than for cattle raising. Regarding labor requirements, cassava cultivation and cattle raising are equally attractive from an economic viewpoint. The cash flow is almost continuous for cattle raising, while for associated and monocropped cassava it happens during 6-7 and 2-4 mo. of the year. Cattle raising is less risky than cassava cultivation. In terms of nutrition, both activities are important. The factor explaining the importance of cattle raising is its role as source of capital for the farmer. Although cassava drying plants would reduce marketing risks and the need to have cattle as a buffer, farmers are not willing to reduce their herds. Recommendations on the future development of both activities are given. (CIAT)

0288

28163 BOHLE, H.G. 1985. Impact of agricultural markets on income distribution. In International Workshop on Agricultural Markets in the Semi-Arid Tropics, India, 1983. Proceedings. Patancheru, Andhra Pradesh, India, International Crops Research Institute for Semi-Arid Tropics. pp.235-241. En., Sum. En., Fr., 15 Ref.

Cassava. Marketing. Costs. Income. Socioeconomic aspects. India.

The role of agricultural markets in generating inequalities in income distribution across different size groups of farmers is examined on the basis of 150 interviews with a stratified sample in 3 agricultural regions of Tamil Nadu, India, where cassava is one of the predominant cash crops cultivated. It is concluded that in the process of agricultural marketing, market access as well as marketing costs are biased against small and marginal farmers. (AS (extract))

0289

26142 BORREN, C.; JANSSEN, W. 1984. El futuro del cultivo de sorgo en la Costa Atlántica. (The future of sorghum cultivation on the Atlantic Coast). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.45-50. Es.

Cassava. Sorghum. Production. Costs. Marketing. Developmental research. Cassava programs. Colombia.

The future development of sorghum in Sucre, Colombia, is discussed aiming at the estimate of the potential market of dried cassava as a substitute for sorghum imports. The deficiency in sorghum production to supply the Colombian animal feed industry urges and facilitates the development of alternate carbohydrate sources such as dried cassava. (CIAT)

0290

19552 BOX, L. 1981. Sociale aspecten van recente ontwikkelingen in cassavateelt, gebruik en onderzoek. (Social aspects of recent developments in the cultivation, use, and development of cassava). In Asseldonk, J.S.O. Van; Box, L., eds. Cassave of tapioca? Verslang van het Symposium Recente Ontwikkelingen in Onderzoek en Gebruik van Cassave, Amsterdam, 1981. Amsterdam, Stichting Onderzoek Wereldvoedselvoorziening. pp.6-22. Nl., 15 Ref.

Cassava. Socioeconomic aspects. Cultivation. Consumption. Marketing. Production. Prices. Costs. Root productivity. Intercropping. Developmental research. Netherlands.

The problems encountered in the relation research - cassava cultivation among small peasants in Latin America are discussed. Characteristics of cassava growers are given: small-scale farmers, scarce resources, poor soils, products sold for the fresh market. Future trends of cassava cultivation are considered. The extent to which the interests of the small-scale cassava producer are taken into account in the research program is analyzed. The 1st impression of the material collected in CIAT's "Abstracts on Cassava" is that research before 1965 was not focussed on the improvement of the cropping system of small-scale producers; however, conclusions about the research during this period are difficult due to the lack of reliable overall data. Research carried out by CIAT since 1968 is also discussed. Breeding was 1st directed toward obtaining high yielding var; later this criterion was broadened, but yield is still of great importance. It is necessary to reduce the gap between potential and current yields obtained by producers. (CIAT)

0291

28326 BRERETON, L. 1986. Root and tuber crops in Barbados. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.19-29. En., Sum. Es., [Ministry of Agriculture, Food & Consumer Affairs, Greame Hall, Barbados]

Cassava. Statistical data. Production. Trade. Marketing. Prices. Cassava programs. Barbados.

The situation of root and tuber crops, especially taro, cassava, yam, sweet potato, and potato, in Barbados is discussed and analyzed. Although the production and exportation of yam and sweet potato decreased during the period 1970-84, cassava and taro production for local consumption, has remained constant. Potato, with the highest consumption, has to be imported. Aspects on cultivation, marketing, and production of these crops are briefly described. Quarantine regulations, past and present government policies, and research, training, and technological development of these crops are indicated. The importance of a credible data base with statistics of root and tuber crops is highlighted. (CIAT)

0292

26861 BROHAN, M. 1986. Tough competition from Thai cassava. Farmline. May 1986:12-13. En., Il.

Cassava. Trade. Costs. Marketing. Feeds and feeding. Production. Prices. Income. Statistical data. Thailand.

The competition between Thai cassava and US maize for the world coarse grain market is analyzed. Aggressive and successful campaigns, based on the product's low prices, low production costs, and exportable surpluses, have been launched by Thai traders to expand their markets. Until 1985, about 85 percent of cassava exports went to the EEC, but recently about 1.7 million t of cassava were shipped to Japan, Portugal, the Soviet Union, Taiwan, South Korea, and North Korea. Although increased sales of cassava (exports rose from 340,000 t in 1967 to 6 million t in 1978) may have displaced up to 1 million t of US maize, its impact has not been entirely negative, as they also promoted soybean purchases as a protein supplement to cassava-based rations. The effects of EEC annual import quota on cassava production and competition are briefly discussed. (CIAT)

0293

28338 BROWNE, G.E. 1986. Root and tuber crops in St. Vincent. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de

Agricultura Tropical. pp.143-168. En., Sum. Es., 4 Ref. [Caribbean Agricultural Research & Development Inst., St. Vincent, West Indies]

Cassava. Cultivation. Production. Statistical data. Marketing. Trade. Consumption. Cassava programs. St. Vincent.

The var. of Colocasia esculenta var. antiquorum, taro, cocoyam, sweet potato, and yam cultivated in St. Vincent are described in detail, and the availability of land and potential expansion, farm characteristics, cropping systems, internal and external demand, and market systems are indicated. A comprehensive study on production costs of these crops is also presented. Cassava is grown in the regions of Dorsetshire Hill and Argyle, but its production is insignificant. It is sown in mixed cropping systems (sweet potato/maize/cassava, sweet potato/cowpea/cassava, sweet potato/cowpea/maize/cassava). Cassava is the only root crop processed; farine is the main by-product, produced in home-based industries. Arrowroot starch production has slowly replaced cassava starch production. Finally, production constraints and the future direction of research are discussed. (CIAT)

0294

26859 BRUN R., J.; LOPEZ P., A.; ROMAN, A.; CABALLERO, C. 1985. Proyecto de generación y validación de tecnologías de producción e industrialización de la mandioca. (A project for technology generation and validation for cassava production and industrialization). San Lorenzo, Paraguay, Ministerio de Agricultura y Ganadería. Servicio de Extensión Agrícola Ganadera. 77p. Es., Il..

Cassava. Cassava programs. Industrialization. Production. Economics. Development research. Socioeconomic aspects. Costs. Labor. Paraguay.

A project for the generation and validation of cassava production and industrialization technologies in Paraguay is presented. The general objective is to increase cassava production and productivity and to improve its processing. Background information is provided on extension services, socioeconomic aspects, and problems of cassava production. A project proposal from the Servicio de Extensión Agrícola Ganadera to CIAT is included; the costs of the project are given in tables. (CIAT)

0295

28330 BUCKMIRE, K.U.; BENJAMIN, R.L.; BURRIS, N. 1986. Root and tuber crops in Grenada. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.51-57. En., Sum. Es., 5 Ref.

Cassava. Production. Sweet potatoes. Tannia. Cocoyam. Grenada.

The situation of sweet potato, cassava, cocoyam, taro, and yams, mainly grown for subsistence in Grenada, is presented. Their supply, cropping systems, yields, production costs and constraints, and the socioeconomic characteristics of the farmers are briefly discussed. The marketing of sweet potato, yams, and aroids is analyzed as well as the government policies related to the support of root crop plant breeding programs.(CIAT)

0296

27641 CARTER, S.E. 1986. Cassava micro-regions in part of eastern Paraguay; an explanation of their form and comparative study of cassava production within some of them. Cali, Colombia, Centro Internacional de Agricultura Tropical. Agroecological Studies Unit. 240p. En., Sum. En., 21 Ref., Il. Contains 17 maps and 2 tables.

Cassava. Production. Plant geography. Ecosystems. Climatic requirements. Soil fertility. Soil requirements. Rainfall data. Cultivation systems. Socioeconomic aspects. Fertilizers. Nutritional requirements. Prices. Costs. Marketing. Harvesting. Field experiments. Soil analysis. Paraguay.

Cassava-specific microregions in part of eastern Paraguay, a climatically homogeneous area, were defined on the basis of secondary data and systematic random sampling of agricultural settlements. It was found that production is concentrated in the departments of Caaguazú, Itapúa, San Pedro, Paraguarí, Cordillera, Caazapá, Guairá, and Alto Paraná. Rural per capita cassava consumption may be as high as 340 kg/yr and, despite an enormous production, problems have been identified, namely low soil fertility and large distances from the principal producing areas. Podzolic soils are mainly used for agricultural purposes and the limits of the microregions correspond to those of the areas of cultivated land. Agricultural production was differentiated on the basis of the principal cash crops grown, and differences in modal farm size were found. Cassava production in both older established settlements and newer colonies relies on traditional methods of land preparation, and harvesting is done as soon as possible when needed for subsistence. The variables and information used to define and describe the microregions are presented as a series of qualitative maps. The microregions are derived and mapped by overlaying these and comparing them manually. They are then described in a quick reference table. The interaction of a set of processes is stressed. The juxtaposition within the study area of areas of commercial cassava production and of areas where the crop is in short supply for subsistence is caused by and dependent upon varying market opportunities, problems of cash supply, labor shortages, soil fertility differences, and, of utmost importance, variable access to land. (AS (extract))

0297

28150 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1985. Research strategies and projections: 1986-1990. Commodity programs: cassava program. In _____. CIAT in the 1980s revisited. A medium-term plan for 1986 to 1990. Cali, Colombia: pp.113-147. En., 2 Ref., Il.

Cassava. Cassava programs. Research. Production. Economics. Colombia.

The strategies and projections of CIAT's cassava program for the period 1986-90 are described and analyzed in detail. Background information is given on the crop including its characteristics and end uses (fresh cassava for foodstuffs, both traditional and innovative dry cassava products). A comprehensive review of the program since its initiation is made and major accomplishments are summarized. The production and potential demand for cassava are analyzed by regions: Latin America, southern and eastern Asia, and sub-Saharan Africa. The cassava program has designed global strategies to achieve its objectives; the following basic activities to fulfill its global mandate are outlined: the role of cassava in the economies of the developing world; basic understanding of the crop; germplasm development; production systems; utilization technologies for fresh cassava, CF, and animal feed; and documentation and information. CIAT's regional responsibilities in Latin America and the Caribbean, sub-Saharan Africa, and southern and eastern Asia are discussed. Staffing projections for the period are presented. (CIAT)

0298

28337 CROSSMAN, S.M.A. 1986. Root and tuber crops in St. Kitts. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.135-142. En., Sum. Es., 4 Ref. [National Agricultural Corporation, P.O. Box 399, Basseterre, St. Kitts]

Cassava. Production. St. Kitts.

The offer, availability, and characteristics of cultivated land, cropping systems, yields, the socioeconomic profile of farmers, production vol. and costs, and the marketing of root and tuber crops grown in St. Kitts (sweet potato, yam, cocoyam, taro, and potato) are briefly analyzed. Government policies on root crop production are reviewed. There is only limited production of cassava starch and CM. (CIAT)

0299

28331 DEGRAS, L. 1986. Root and tuber crops in Guadeloupe. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.59-68. En., Sum. Es., 20 Ref., Il. [Inst. National de Recherches Agronomiques, Domaine Duclos, 97170 Petit Bourg, Guadeloupe]

Cassava. Maps. Intercropping. Cassava programs. Production. Guadeloupe.

The main root crops grown in Guadeloupe and their annual production rates are indicated. The few areas of the island are planted to cassava; this root crop is grown in mixed cropping systems (aroids/cassava/cocoa/coffee, aroids/sweet potato/cassava, or cassava/sweet potato) or in monoculture in the north of Grande-Terre, in Marie-Galante, and over the Capesterre-Belle-Eau area of Basse-Terre. Both sweet and bitter cv. are grown. Since the 2nd World War, root crop production in Guadeloupe, especially that of cassava, has declined due to the importation of other carbohydrate commodities, diversification, rise in prices for export crops, lack of growers' associations, and adoption of European and North American consumption patterns. (CIAT)

0300

26793 DENNIS, P.G.; FOSTER, D. 1985. Country paper on root, tuber crops and plantains. In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.112-120. En.

Cassava. Production. Marketing. Prices. Postharvest losses. Socioeconomic aspects. Pests. Planting. Cassava programs. Developmental research. Legal aspects. Liberia.

The situation of root, tuber, and plantain crops in Liberia is described. In this country approx. 75 percent of the population aged 15-64 is engaged in agriculture. These products are cultivated on a subsistence level; there is no commercial processing, except for cassava by-products, especially gari which is sold in the supermarkets of Monrovia. Traditional techniques are used for cultivating and preparing these products. The marketing system is composed of a large no. of participants (subsystems) who fix their own prices. Commercialization margins are broad and there are neither commercialization nor price policies for these products. Major constraints to cassava production are discussed. (CIAT)

0301

26763 DINAS PERTANIAN TANAMAN PANGAN DAERAH. PROPINSI TINGKAT I JAWA TIMUR. 1985. Potensi dan prospek pengembangan ubi kayu di Jawa Timur. (Potential and prospects of cassava development in East Java). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.64-96. In., Sum. In., En., Il.

Cassava. Costs. Cultivation. Productivity. Cassava programs. Trade. Cultivation systems. Labor. Harvesting. Production. Indonesia.

East Java is the major cassava producing area in Indonesia. During the 3 Pelita project (1969-83), East Java has had a mean area of about 438,674 ha (31.41 percent of the national area) and has produced about 3,638,390 t (29.98 percent of the national production). Both area and crop production tend to decrease (0.06 percent per annum). Intensification of cassava cultivation has so far been unsuccessful due to both agrotechnological and marketing factors. The development of cassava during Pelita IV (1984-88) includes intensification and diversification. The system of cassava development will include nucleus estates of smallholders. To support this program, improved agrotechnology, extension work, and increased availability of labor and stock materials are required. (AS)

0302

26748 DOUGAN, J. 1985. Report on a visit to Colombia to advise CIAT on consumer acceptability trials of stored cassava, 3-18 October 1985. London, Tropical Development and Research Institute. Overseas Development Administration. R1286. 41p. En., Sum. En., 2 Ref.

Cassava. Fresh products. Processed products. Cassava programs. Organoleptic examination. Palatability. Human nutrition. Cultivars. Colombia.

A report is presented on an advisory visit of the Tropical Development and Research Institute to Colombia to assist CIAT in the design of questionnaires and consumer evaluation panels regarding cassava treated with 0.4 percent thiabendazole and stored in plastic bags. The possibility of using this technique on a commercial level is discussed. The last phase of the project included 100 consumers from 5 neighborhoods of Bucaramanga (Santander). Fresh and treated roots from 4 cassava var. were evaluated. The questionnaires are included. (CIAT)

0303

25242 DRESEN, B.; GAESE, H. 1984. Neuere entwicklungen brasilianischer erdolsubstitutionspolitik. (New developments in the Brazilian policy on substituting alcohol for oil). Entwicklung und Landlicher Raum 18(1):22-25. De., Sum. De., 12 Ref., Il. [Fachhochschule Koln Institut fur Tropentechnologie, Peitweg 1 5000 Koln, Germany]

Cassava. Alcohol. Factories. Feeds and feeding. Waste utilization. Fertilizers. Ecology. Brazil.

The present alcohol production in Brazil replaces 30 percent of the oil use of 11 percent of the oil import of the country; it also replaces about 35 percent of the petrol used in cars. Of the 3.2 million ha planted to sugarcane, 6.4 percent of the arable soils, about 2.4 percent is used solely for alcohol production. Growing of the crop and the problems involved are briefly discussed. The use of vinasse as stock feed and fertilizer has solved environmental problems but there still remain other problems to be tackled. The use of other agricultural products such as cassava and babassu for alcohol production is described. (Abstracts on Tropical Agriculture)

0304

26730 ELUAGU, L.S.; OKEREKE, O. 1985. The socio-economic impact of gari traders' association in Imo State of Nigeria. Oxford Agrarian Studies 14:92-103. En., Il. [Dept. of Agricultural Economics, Nigeria Univ., Nsukka, Nigeria]

Cassava. Gari. Trade. Prices. Price maintenance. Consumption. Socioeconomic aspects. Nigeria.

The extent gari traders' associations in Imo State, Nigeria, influence the

marketing of gari was studied. The functions of these associations were determined as well as the degree of collusion among them in Imo. Consumer attitudes toward these associations were also examined. Associations were found to create a favorable marketing environment; however, gari prices were fixed at noncompetitive levels, a monopoly of market stalls was observed, and entry into the gari trade is difficult. The supply has been controlled to create artificial scarcity. (CIAT)

0305

28340 FERGUSON, T.U.; WILSON, L.A. 1986. Root and tuber crop programs at the University of the West Indies. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.185-189. En., Sum. Es. [Dept. of Crop Science, The Univ. of the West Indies, St. Augustine, Trinidad, West Indies]

Cassava. Cassava programs. Trinidad and Tobago.

Research work on root crops (yam, sweet potato, cassava, potato, and aroids- in particular, cocoyam), carried out by the Faculty of Agriculture of the U. of West Indies, is summarized. Regarding cassava, the major achievements have been the identification of factors limiting its development in the region, the understanding of its growth mechanisms, selection, development, and release of cv., development of improved systems for mechanization, quantification of yield performance on different soil types, studies on the dormancy mechanism in root crops, and development of packages of cultural practices. Outreach and training activities are mentioned, and proposals for research activities on root crops are given. (CIAT)

0306

28341 FERGUSON, T.U. 1986. Root and tuber crops in the Caribbean. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.191-219. En., Sum. Es. [Dept. of Crop Science, The Univ. of the West Indies, St. Augustine, Trinidad, West Indies]

Cassava. Production. Statistical data. Marketing. Trade. Cassava programs. Research. Caribbean.

The importance and production of root crops in 17 Caribbean countries are analyzed. Statistical data on the production and per capita production of the following root crops are given: yam, cassava, sweet potato, taro, cocoyam, and potato. Cassava is the major root crop grown (734,000 t in 1982-83), followed by sweet potato (551,000 t). Cuba, Dominican Republic, and Haiti are the largest cassava growing countries, and Cuba, Grenada, Haiti, and St. Vincent have the largest per capita production. Constraints to research, training, production, and utilization for each crop are discussed. Finally, the importance of a regional research network on root crops is stressed, its objectives are indicated, and possible project activities are listed. (CIAT)

0307

28334 FLETCHER, R.E. 1986. Root and tuber crops in Montserrat. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.101-110. En., Sum. Es., 6 Ref. [Caribbean Agricultural Research & Development Inst., c/o Ministry of Agriculture, P.O. Box 272, Plymouth, Montserrat]

Cassava. Productior Statistical data. Socioeconomic aspects. Marketing. Cassava programs. Montserrat.

The situation of root and tuber crops in Montserrat is presented. The main cropping systems, available land, socioeconomic factors, production levels, productivity, imports, and price structure and markets are discussed. Cassava is almost unknown in Montserrat; it is specifically grown for processing into cassava bread during the festival season. The crop is rarely grown in pure stand, but is planted along field borders and contours, and intercropped with pigeon pea, sweet potato, and aroids. The recommendations given include that of conducting more studies on cassava to improve its production and introduce small-scale processing. (CIAT)

0308

26359 FONDO NACIONAL DE INVESTIGACIONES AGROPECUARIAS. ESTACION EXPERIMENTAL MONAGAS. 1985. Yuca. (Cassava). In _____. Informe Anual 1984. Maturín, Venezuela. pp.125-165. Es., Il.

Cassava. Cultivars. Developmental research. Production. Root productivity. Timing. Growth. Plant development. Soil fertility. Starch content. Carbohydrate content. Leaves. Fertilizers. N. P. K. Nutritional requirements. Venezuela.

Advances in the research projects carried out at the Monagas exptl. station in Maturín, Venezuela, to select cassava cv. adapted to potential production regions are presented. Forty-seven cv. were evaluated regarding their morphological characteristics (growth habit, height, type of branching), yield and its components, DM, and starch content. Data are presented on total biomass production of some cv. during a period of 0-120 days, CGR, RGR, LAI, leaf angle, leaf retention and longevity, lateral growth, and coverage. The collection, management, and clonal classification of materials from different zones of the country are described; among the materials selected are Pata de Negro, Brasilera-D, and M-Ven 7. Other research projects consisted in evaluating the soil analyses and the response of some cv. to N, P, and K fertilization to determine the type of fertilization according to soil type. The best NPK fertilizer formulas according to multilocational trials were 120-143-143, 75-90-90, and 30-143-143. The reaction of 23 cassava clones to Xanthomonas campestris pv. manihotis was studied, as well as the effect of the disease on cutting quality (percentage of germination) depending on the cutting height when die-back symptoms appear. Other aspects considered include postharvest management and incidence of brown streak root rot. (CIAT)

0309

28332 FORDE, B.J. 1986. Root and tuber crops in Guyana. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.69-80. En., Sum. Es., 8 Ref., Il. [National Agricultural Research Inst., Coastal Plains Field Research Unit, Burma, Mahaicony, E.C.D. Georgetown, Guyana]

Cassava. Production. Maps. Statistical data. Socioeconomic aspects. Marketing. Cassava programs. Guyana.

In Guyana, cassava is the most important root crop; root crops occupy the 5th place of importance in national food crop production. The main cropping systems used by the farmers in the different regions of the country are described. More than 1 crop is planted to reduce risks; in the Pomeroon region, cassava is planted as an intercrop with tree crops such as citrus, avocado, and other mixed fruits. The lowest price was paid for cassava. Although the domestic demand for root and tuber crops is primarily as fresh

food, cassava is also consumed processed (flour, starch, cassareep, bread). Since 1970 the government of Guyana has restricted the importation of energy-rich agricultural products; therefore, they have been replaced with locally produced root and tuber crops. During this same period, the Accelerated Production Drive program was started; its objective was to promote cassava production and its processing into flour and animal feed. Unfortunately, the program was not successful. The staff of the National Research Institute is listed; research has focused mainly on rice and cassava. The results of research carried out on root crops are briefly presented, and for cassava, it is proposed to continue the evaluation of cv. and to study the different cropping systems. (CIAT)

0310

28328 FORDE, S.C. 1986. The root and tuber crops program at CARDI. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.37-42. En., Sum. Es. [Caribbean Agricultural Research & Development Inst., Univ. Campus, St. Augustine, Trinidad and Tobago]

Cassava. Cassava programs. Research. Trinidad and Tobago.

The research, training, and development activities related to sweet potato, yam, cassava, and aroids, carried out by the root crop program of the Caribbean Agricultural Research and Development Institute (Trinidad and Tobago), are presented. The present interest in cassava is its use as a maize substitute in animal feeds. The following activities are in progress: introduction and evaluation of CIAT cv. in multilocational trials; study of selected cassava lines resistant to CBB; development of improved cassava production through mechanized systems of planting and harvesting, and fertilizer and herbicide application; development of systems for chipping and drying cassava for use in animal feeds. (CIAT)

0311

26789 GABON. MINISTERE DE L'AGRICULTURE, DE L'ELEVAGE ET DE L'ECONOMIE RURALE. 1985. Obstacles a la production et a la commercialisation des racines, tubercules et plantains en Afrique. (Production and marketing constraints of roots, tubers, and plantains in Africa). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.76-88. Fr.

Cassava. Production. Cultivation. Plant breeding. Cultivars. Marketing. Cassava programs. Developmental research. Legal aspects. Gabon.

Production and marketing constraints of roots, tubers, and plantains in Gabon are analyzed; a traditional subsistence economy persists, together with the modern exploitation of mining and forestry. The problems faced are discussed and possible solutions are given. The results of var. improvement in cassava are given as well as selected var. and their characteristics. (CIAT)

0312

26786 GBEDOLO, Y.M.; FAVI, F. 1985. Points sur la situation des plantes a racines et tubercules en République Populaire du Benin. (Some aspects of the situation of root and tuber crops in Benin). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.1-12. Fr., Il.

Cassava. Cultivation. Production. Storage. Root productivity. Distribution.

Prices. Weeds. Marketing. Processing. Statistical data. Cassava programs. Developmental research. Benin.

The situation of cassava and other starchy crops in Benin during 1969-81 is examined. Cassava is an important crop due to its adaptability and low tillage and water requirements; it is grown in the southern part of the country with yields of 266,180, 104,940, and 73,520 t/yr, resp., in Oume, Atlantique, and Mono; it is also cultivated in the North with yields of 26,920 and 29.950 t/yr, resp., in Borjou and Atacora, and in the central zone with 158,830 t/yr in Zou. Cassava yields, however, are low (6.31 and 6.58 t/ha in 1976 and 1981, resp.), attributable to pests, diseases, and weeds. This fact, together with the rapidly increasing population and the low crop production (660,340 t/yr in the whole country), cause the demand and prices of by-products, especially that of gari, to rise. Fresh cassava is hardly marketed because of conservation, storage, and transportation constraints. (CIAT)

0313

23169 GOMEZ, G.; LYNAM, J.K.; BEST, R. 1983. Programa de actividades futuras. (Program of future activities). In _____., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Segundo informe julio 1982-mayo 1983. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI/ACDI-CIAT. pp.51-53. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Developmental research. Drying. Marketing. Production. Cultivars. Technology evaluation. Colombia.

The program of future activities for the collaborative project Integrated Rural Development program/Canadian International Development Agency/CIAT is presented. The following aspects should receive special emphasis: (1) cassava root production and marketing on the Atlantic Coast of Colombia, (2) validation of farm-level improved production technology, and (3) technological improvements in the drying process. (CIAT)

0314

23157 GOMEZ, G.; CARDONA, F. 1982. Informe de las actividades del proyecto noviembre 1981-junio 1982. (Report on project activities: November 1981-June 1982). In Centro Internacional de Agricultura Tropical, 1982. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la costa norte de Colombia; producción y procesamiento de yuca en el departamento de Sucre. Primer informe noviembre 1981-junio 1982. Cali, Colombia, Proyecto Cooperativo DRI/ACDI/CIAT. pp.5-16. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Developmental research. Factories. Marketing. Drying. Colombia.

The advances in the development project of a pilot plant for the natural drying of cassava in Betulia (Sucre, Colombia), over the period Nov. 1981-June 1982, are briefly described. CIAT participates in the project as a consultant. Cassava drying seems to be a feasible alternative for the marketing and commercialization of surplus cassava on the Atlantic Coast. According to production costs, the min. drying area for this type of plant is estimated to be 500 square meters and 360 t fresh cassava are needed over a 20-wk. period to produce 135 t dry cassava. A financial analysis of processing plants with drying areas of 500 and 1,000 square meters is presented . Some factors partially responsible for low yields are poor seed

quality, lack of machinery for good soil preparation, lack of ridges on heavy soils, and the use of inadequate plant densities and spatial arrangements. The schedule of future activities is included. (CIAT)

0315

26774 GURITNO, B.; UTOMO, W.H. 1985. Pokok-pokok pikiran pengembangan tanaman ubi kayu. (Basic considerations regarding cassava development). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.251-274. In., Sum. In., En., 6 Ref., Il.

Cassava. Prices. Costs. Root productivity. Factories. Harvesting. Trade. Statistical data. Developmental research. Indonesia.

The profitability of cassava is reviewed considering EEC policies and problems of soil impoverishment. It is demonstrated that cassava is still profitable and that soil impoverishment can be overcome by proper cropping systems. Basic considerations regarding cassava development are also discussed. Suggestions cover the farmers as the producer, factories as the consumer, government offices and cooperatives as the supervisor, and banks as the credit organizer. (AS (extract))

0316

26805 HAAN, G. DE 1986. Buying behaviour and changing cassava consumption habits in Bucaramanga; an inventory study for the project "Fresh cassava for urban markets" of the Centro Internacional de Agricultura Tropical in Colombia. Mag.Sc. Thesis. Utrecht, Netherlands, Agricultural University of Wageningen. 94p. En., Sum. En., 40 Ref., Il.

Cassava. Socioeconomic aspects. Fresh products. Consumption. Costs. Prices. Trade. Developmental research. Cassava programs. Cassava roots (vegetable). Colombia.

CIAT's project of fresh cassava for urban markets aims at introducing a simple low-cost storage technology for cassava. It is expected that with the storage method (packing the roots in plastic bags and treating them with a fungicide), losses during the marketing will decrease, resulting in a lower consumer price. Improved quality and increased buying and storing convenience for consumers would also be achieved. Consumers' attitudes towards cassava and other basic food products were investigated. A household survey has been conducted in the city of Bucaramanga (Colombia). The buying behavior was especially important issue, since the buying frequency and the amounts bought were thought to be an indication of consumers' willingness to buy storable cassava. Several groups of consumers were distinguished, depending on their socioeconomic status and their access to markets. It was found that the majority of the consumers (72 percent) buy cassava at a market. The distance home-market influenced buying behavior considerably. Daily market visiting prevails for those living close to a market, while people living in a remote neighborhood either go once a week, or visit a neighborhood shop to save time and transport money. These shops usually have higher prices and quality is, in general, lower than at the markets. Except for distance factors, the availability of money also accounts for differences in buying behavior. A continuous shortage of money compels many poorer consumers to make frequent purchases. A relatively bad access to a market had a significant negative influence on the total amount of cassava consumed/person. By eliminating buying inconvenience through the supply of storable cassava, consumption might rise. Most respondents reacted positively to the idea of selling storable cassava, but the background of these reactions differ; while the poorest consumers hope that a lower price will be the result, higher income

groups see advantages in the quality aspects. Increased buying and storing convenience will result for the inhabitants of remote neighborhoods and for those who do not possess a refrigerator, but those who visit a market frequently anyhow will not change their buying behavior because of this fact. The wish to buy products as fresh as possible and the continuous shortage of money will be strong forces to maintain the prevailing shopping pattern with frequent market visits. It is therefore of the utmost importance to adapt the supply of storable cassava to the wishes and possibilities of consumers. A flexible supply in quantities that consumers are able to buy and a lowering of the price will be the best strategies to serve the needs of the poorer urban consumers. (AS)

0317

27605 HAHN, S.K.; KEYSER, J. 1985. Cassava: a basic food of Africa. Outlook on Agriculture 14(2):95-99. En., Sum. En., 17 Refs. [International Inst. of Tropical Agriculture, P.M.B. 5320, Ibadan, Nigeria]

Cassava. Cultivation. Cassava programs. Research. Africa.

The importance of cassava as a staple food for one-eighth of the world's population is briefly highlighted and the factors that militate against the widespread marketing of cassava are discussed. The per capita consumption of fresh cassava is greatest in Africa, averaging 102 kg/yr. In the Central African Republic, Congo, Gabon, and Zaire, consumption exceeds 300 kg/person/yr. Cassava is grown in 31 African countries, stretching in a wide belt from Madagascar in the SE to Senegal in the NW. Since its foundation in 1967, the International Institute of Tropical Agriculture (Nigeria) has devoted a great deal of effort to the development of improved cassava var. and better methods of cultivation and disease control. Priority has been given to the diseases and pests that cause the greatest losses in the crop: CAMD, CBB, and the introduced pests Mononychellus tanajoa and Phenacoccus manihoti. Other aspects reviewed include agronomic practices, HCN content, interspecific crosses, and outreach activities. (CIAT)

0318

26316 HERSHEY, C.H.; MORENO, R.; LYNAM, J.; BEST, R. 1986. Actividades 1985/1986. (Activities during 1985-86). In Best, R.; Ospina P., B., comp. El desarrollo agro-industrial del cultivo de la yuca en la Costa Atlántica de Colombia. Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de secado natural de yuca período julio 1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. v.2, pp.91-93. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Drying. Cassava programs. Cultivars. Cultivation. Developmental research. Colombia.

The activities proposed for the dried cassava project during 1985-86 on the Colombian Atlantic Coast are briefly described; these include regional trials, agricultural production systems and field expt. in Córdoba, cassava production and marketing follow-up studies, and improved technologies for cassava drying. (CIAT)

0319

26309 HOOGERVOST, J.; VAN WIJK, P.; JANSSEN, W. 1986. La disponibilidad de tierra y de mano de obra para la expansión del cultivo de yuca. (Availability of land and labor to expand cassava cultivation). In Best, R.; Ospina P., B., comp. El desarrollo agro-industrial del cultivo de la yuca en la Costa Atlántica de Colombia. Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de

secado natural de yuca periodo julio 1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. v.2, pp.31-39. Es., Il.

Cassava. Socioeconomic aspects. Labor. Costs. Cultivation. Timing. Cassava programs. Development research. Colombia.

A case study was conducted in Betulia (Sucre, Colombia) to understand better the factors that influence the availability of land, labor, and mechanization services for cassava cultivation. The most important mechanism to increase land availability for cassava cultivation in the short term is rent land; for those cooperatives that have a low availability of land, the collective rental of land (more than 10 ha) would be the best way to eliminate the restriction. The labor market is characterized by increased availability and a highly seasonal demand. In areas with excess labor, large-landed estates predominate; if the dried cassava project is established in these areas, considerable social benefits would occur.(CIAT)

0320

19551 HOOGH, J. DE 1981. Belangentegenstellingen rond cassave. (Differences in opinion on the subject of cassava). In Asseldonk; J.S.O. Van.; Box, L., eds. Cassave of tapioca? Verslag van het Symposium Recente Ontwikkelingen in Onderzoek en Gebruik van Cassave, Amsterdam, 1981. Amsterdam, Stichting Onderzoek Wereldvoedselvoorziening. pp.1-5. Nl,

Cassava. Marketing. Production. Consumption. Socioeconomic aspects. Netherlands.

EEC income policies are discussed regarding internal policies for cereals and subsequent changes in their production and consumption. The extent of these changes depends on the possibilities of substitution of the producers/consumers. The forage industry imports cassava with little or no taxes for processing, whenever technically feasible, instead of expensive cereals. Floor and intervention prices for cereals have increased their production in the EEC; however, consumption has stagnated. The expenses for restitutions and interventions are consequently growing while on the other hand the proceeds from levies on cereals are decreasing. It is important for both cereal producers and the EEC as a whole to solve this problem; cereal producers have felt that the problem could be solved by modifying cassava imports. It is not in the interest of the Dutch cattle raisers that substitution products, like cassava, become more expensive. This would have negative consequences on the income and employment in this sector and on the supply of raw materials for processing industries. Cassava producers depend greatly on the export of their product for their income, so they can hardly accept EEC import restrictions. An import quota for cassava, with an obligation for the EEC to buy at a certain price, independent of the world market circumstances, is proposed. (CIAT)

0321

28186 IKPI, A.E.; GEBREMESKEL, T.; HAHN, N.D.; EZUMAH, H.; EKPERE, J.A. 1986. Cassava - a crop for household food security. A 1986 situation analysis for Oyo local government area Nigeria. Ibadan, Nigeria, International Institute of Tropical Agriculture. Socio-Economic Unit. 125p. En., Sum. En., 77 Ref., Il.

Cassava. Socioeconomic aspects. Cultivation. Production. Consumption. Cassava programs. Statistical data. Processing. Marketing. Cari. Cassava flour. Human nutrition. Toxicity. Costs. Labor. Income. Nigeria.

A survey was conducted in Oyo Local Government Area, Nigeria, to analyze cassava cultivation, processing, use, and acceptance in order to determine its potential for household food security, income generation for rural households, and improved nutrition. Major findings are summarized, based on interviews to 150 farmers regarding production, processing, and marketing. (CIAT)

0322

26310 JANSSEN, W. 1986. La demanda de yuca seca en Colombia. (The demand for dried cassava in Colombia). In Best, R.; Ospina P., B., comp. El desarrollo agro-industrial del cultivo de la yuca en la Costa Atlántica de Colombia. Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de secado natural de yuca período julio 1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. v.2, pp.41-50. Es., 1 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Dried roots. Socioeconomic aspects. Processed products. Trade. Statistical data. Feeds and feeding. Industrialization. Cassava programs. Developmental research. Colombia.

The results of a survey conducted in late 1984 to determine the demand for dried cassava in Colombia are presented. The survey covered the animal feed industry and pig, broiler chick, and egg producers. It was estimated that dried cassava at a relative price, equivalent to 78 percent the price of sorghum, would have an annual demand of 144,000 t; however, the demand for dried cassava is very sensitive to price fluctuations. Dried cassava would be mostly used to elaborate feed concentrates for egg and pig production. At an 8 percent growth rate of the feed industry, the demand for 1990 can be expected to be 200,000 t dry cassava. The Atlantic Coast region is expected to provide at least 50 percent of this dried cassava (250,000 t fresh cassava). (CIAT)

0323

26311 JANSSEN, W.; CORREA, C.; FRANCO, A. 1986. El impacto de la industria de yuca seca en el mercado de la yuca en la Costa Atlántica. (The impact of the dried cassava industry on the cassava market of the Atlantic Coast). In Best, R.; Ospina P., B., comp. El desarrollo agro-industrial del cultivo de la yuca en la Costa Atlántica de Colombia. Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de secado natural de yuca período julio 1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. v.2, pp.51-57. Es., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Industrialization. Trade. Dried roots. Production. Prices. Consumption. Simulation models. Cassava programs. Developmental research. Colombia.

The results of a simulation model, designed to estimate the impact of the dried cassava industry on the cassava market of the Colombian Atlantic Coast, are presented. The development of this type of industry seems to be promising for the region. Fresh cassava consumption will not be significantly affected by the dried cassava industry. On the other hand, the development of this industry will largely depend on the expected yield increases; if yields increase rapidly, almost 6000 additional years of employment will be provided for the region and a considerable amount of money will be saved from sorghum imports. The social benefits of the dried cassava industry development are estimated to be over US$1000 millions/yr. (CIAT)

0324

26144 JANSSEN, W. 1984. El comercio de la yuca fresca en los Departamentos de Atlántico, Bolívar, Córdoba y Sucre. (Fresh cassava trade in the departments of Atlántico, Bolívar, Córdoba, and Sucre). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.58-64. Es., 2 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Trade. Prices. Socioeconomic aspects. Developmental research. Cassava programs. Colombia.

The results of a survey among 506 cassava middlemen (wholesalers and retailers) to investigate the rural and urban marketing structure for fresh cassava, in the departments of Atlántico, Bolívar, Córdoba, and Sucre (Colombia), are discussed. The course of fresh cassava from the farmer to the consumer is briefly described. Commercialization costs for fresh cassava are high due to perishability problems and uncertainty in demand, especially in urban centers. Although cassava has an attractive price in rural areas, its price in urban areas is too high compared with other crops (potato, plantain, yams). Research is being conducted on solving perishability factors in cassava, which cause most of the marketing problems. (CIAT)

0325

26145 JANSSEN, W. 1984. El consumo de la yuca fresca en los Departamentos de Atlántico, Bolívar, Córdoba y Sucre. (Fresh cassava consumption in the departments of Atlántico, Bolívar, Córdoba, and Sucre,. In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.65-71. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Consumption. Socioeconomic aspects. Prices. Cassava programs. Developmental research. Colombia.

The results of a survey among 480 housewives of rural and urban centers in the departments of Atlántico, Bolívar, Córdoba, and Sucre (Colombia) on fresh cassava consumption are presented. The consumption of cassava and yam decreases from rural to urban areas due to factors related to deterioration. Cassava is of major importance for the rural consumer, being less important for the urban consumer. Cassava as food is relatively more important for the lower income groups than for the high-income groups. In general, cassava consumption decreased from 1980 to 1983, this reduction ranging between 9-46 percent. (CIAT)

0326

26152 JANSSEN, W. 1984. La selección de sitios para el establecimiento de plantas de secado natural de yuca. (The selection of sites for the establishment of cassava natural drying plants). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.112-120. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Drying. Factories. Cassava programs. Economics. Production. Marketing. Socioeconomic aspects. Developmental research. Prices. Colombia.

The process followed to select sites for the establishment of cassava natural drying plants in the departments of Atlántico, Bolívar, Córdoba, and Sucre (Colombia) is described. The criteria used to evaluate new areas are discussed: (1) the potential to increase cassava production, (2) the potential to establish cassava natural drying plants, and (3) the impact of the projects on the socioeconomic situation of the zone. A survey among 420 farmers of the region was conducted based on these criteria. Based on a 0-4 scale, each criterion was evaluated for the 4 departments, indicating that, in terms of suitability for the establishment of new plants, Córdoba ranked 1st followed by Sucre, and then Atlántico and Bolívar. The results of a specific question asked to farmers on whether they would plant more or less cassava if prices were guaranteed, are given. (CIAT)

0327

26141 JANSSEN, W. 1984. Utilización de la tierra e importancia de la yuca en la finca DRI en los Departamentos de Atlántico, Bolívar, Córdoba y Sucre. (Land use and importance of cassava on the DRI farm in the departments of Atlántico, Bolívar, Córdoba, and Sucre). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.37-44. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Socioeconomic aspects. Land use. Prices. Marketing. Root productivity. Developmental research. Cassava programs. Colombia.

The results of a survey conducted in 1983 among 416 farmers participating in the Integrated Rural Development project (DRI, Colombia) in Atlántico (60), Bolívar (66), Córdoba (156), and Sucre (134), on land use and importance of cassava within the farming system, are presented. Except for Bolivar, where cassava and yam plantings decreased, increased land use attributable to increased credit availability was observed. In general, 1.7 ha cassava was planted per farm in 1982-83, mainly in association with yam, maize, and plantains; 55 percent of the land planted included cassava. On the other hand, cassava monocrops are not common and represent an option only when not enough money is available to plant cassava in association. Over 70 percent of the farmers make arrangements with middlemen prior to harvest and more than 50 percent of the cassava is for human consumption. The increased production of these traditional crops has caused marketing problems; in the case of cassava, drying projects have tried to solve them. (CIAT)

0328

23163 JANSSEN, W.; OSPINA P., B. 1983. Actualización de las apreciaciones económicas del secado natural de la yuca. (Updating economic estimates of cassava natural drying). In Gómez, G., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Segundo informe julio 1982-mayo 1983. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI/ACDI-CIAT. pp.17-24. Es., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Economics. Drying. Cassava programs. Developmental research. Costs. Development costs. Colombia.

Based on the experience of the Betulia cassava drying pilot plant (Sucre, Colombia) and on the information collected at the 6 new drying plants established on the Atlantic Coast, the economic estimates of the 1981-82 economic feasibility study of cassava natural drying plants in the region

were updated. Investments and depreciations were reestimated as well as operational costs and profitability. (CIAT)

0329

23164 JANSSEN, W. 1983. Estudios económicos sobre la producción y el mercadeo de la yuca. (Economic studies on cassava production and marketing). In Gómez, G., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Segundo informe julio 1982-mayo 1983. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI/ACDI-CIAT. pp.25-28. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Economics. Marketing. Production. Consumption. Cultivars. Statistical data. Cassava programs. Developmental research. Colombia.

Partial results of the survey carried out in Nov. and Dec. 1982 on cassava production and marketing on the Colombian Atlantic Coast are briefly discussed; 29 municipalities of Atlántico, Bolívar, Córdoba, and Sucre were surveyed, and most of the information came from farmers owning less than 20 ha. Cassava is grown mainly in association, especially with maize and maize/yams; other minor associations include cassava/tobacco and cassava/millet/maize/pigeon pea. Only 16 percent of the cassava produced in Atlántico is for self-consumption, whereas in the other 3 departments it ranges between 34-40 percent. In Atlántico 80 percent of the production is destined for regional markets, mostly for human consumption; the corresponding figure for the other 3 departments is 60 percent. (CIAT)

0330

23159 JANSSEN, W.; OSPINA P., B. 1982. Estudio de factibilidad económica para plantas de secado natural de yuca en la Costa Atlántica de Colombia. (Economic feasibility study for cassava natural drying plants on the Colombian Atlantic Coast). In Centro Internacional de Agricultura Tropical. 1982. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la costa norte de Colombia; producción y procesamiento de yuca en el Departamento de Sucre. Primer informe noviembre 1981-junio 1982. Cali, Colombia, Proyecto Cooperativo DRI/ACDI-CIAT. 16p. Es., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Factories. Drying. Economics. Costs. Cassava programs. Dried roots. Colombia.

An economic feasibility study for cassava natural drying plants on the Colombian Atlantic Coast, based on data obtained in 1981-82 during the operation of a pilot plant located in Betulia (Sucre), is presented for drying floor areas of 500 and 1000 square meters, with a processing capacity of 360 and 720 t fresh roots over a 20-wk. period (approx. 135 and 270 t dry cassava, resp.). Cost:benefit (sensitivity and sales margin analyses) and financial analyses are presented. The results indicate that, under the specified conditions, the natural drying of cassava for animal feed seems to be profitable. (CIAT)

0331

26762 KANTOR WILAYAH DEPARTEMEN PERDAGANGAN PROPINSI JAWA TIMUR. 1985. Peranan ubi kayu dalam sektor perdagangan di Jawa Timur. (The role of cassava in the trade sector of East Java). In Nugroho, W.H.; Sumitro, S., Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.48-63. In., Sum., In., En.

Cassava. Production. Trade. Statistical data. Prices. Distribution. Cassava chips. Gaplek. Alcohol. Dried roots. Pellets. Indonesia.

Cassava is not only used for food, but is also processed as chips, alcohol, or fructose. Cassava is usually exported as dried cassava (gaplek) or CF. Indonesian exports of dried cassava are smaller than those of Thailand (in 1984, 15 percent that of Thailand). Low exports are due to the lack of cassava processing factories in the country. (AS)

0332

26791 KWAME, A.A. 1985. Country paper on situation of roots, tubers and plantains in Ghana. In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.94-103. En., Il.

Cassava. Production. Marketing. Prices. Processing. Postharvest losses. Socioeconomic aspects. Root productivity. Cassava programs. Developmental research. Ghana.

The situation of starchy food crops in Ghana is described. An estimated 19 percent of cropped land is planted to root and tuber crops. Cassava is cultivated almost all over the country with 315,000 and 290,000 ha planted to the crop in 1980 and 1985, resp. Expected production of cassava for 1985 is 290,100 MT. Food production is characterized by small farms, lack of resources, low incomes, and rudimentary technologies. Marketing and price policies are described, which, in the case of subsistence foods, are in the hands of a large no. of middlemen. The only government agency, Ghana Food Distribution Co., handles, at the most, about 10 percent of this trade. Prices are unfavorable to producers, increased by deficient transportation and storage, high rates of product deterioration, absence of credit, and ineffective governmental intervention. (CIAT)

0333

26787 LEUMASSI, P. 1985. Situation du secteur des racines, tubercules et plantains au Cameroun. (Situation of roots, tubers, and plantains in Cameroon). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.13-26. Fr.

Cassava. Trade. Prices. Costs. Production. Socioeconomic aspects. Statistical data. Developmental research. Cassava programs. Cameroon.

The situation of cassava and other starchy crops in Cameroon is examined; there, food production is affected by rudimentary methods of cultivation, transformation, and conservation, regional caloric deficiencies, inadequate distribution, storage, and price structures, and rural migration. Cassava accounts for 20.12 percent of the total food production with 1938 t/ha and 45.7 kg per capita/yr; it is consumed fresh or processed. Channels of distribution and marketing are characterized by atomization and lack of equipment. Price policies, systems and margins, postharvest losses, and official intervention are discussed. Total cassava production has decreased from 719,000 t (1972) to 625,000 t (1981), and area planted to cassava from 507,747 ha (1976) to 401,954 ha (1980). (CIAT)

0334

28335 LOWERY, J.E. 1986. Root and tuber crops in Nevis. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.111-121. En., Sum. En., 8 Ref. [Caribbean

Agricultural Research & Development Inst., P.O. Box 442, Charlestown, Nevis]

Cassava. Production. Statistical data. Marketing. Cassava programs. Nevis.

The 4 main starchy root crops grown in Nevis (sweet potato, yam, cocoyam, and cassava) are described regarding production, wholesale and retail prices, and domestic and external demand. Cassava is grown on a small scale, almost exclusively for home use. It is planted as an alternative to leaving the land fallow; therefore the most common planting time is between Jan.-March, coinciding with the dry season. Silba pendula is the most important pest, but no control measures are applied. The yield level calculated by the Caribbean Agricultural Research and Development Institute is of 1596 kg/ha. It is recommended that any cassava research be directed toward livestock feed rather than human consumption. (CIAT)

0335

23165 LYNAM, J.K. 1983. Cooperación en el desarrollo de proyectos de investigación agronómica. (Cooperation in the development of agronomic research projects). In Gómez, G., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Segundo informe julio 1982-mayo 1983. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI/ACDI-CIAT. pp.29-37. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Developmental research. Cultivars. Root productivity. Economics. Production. Consumption. Soil analysis. Intercropping. Socioeconomic aspects. Statistical data. Colombia.

Three cassava cv. (local var. Venezolana, improved cv. M Col 1684, and hybrid CM 342-170) in monoculture and in association with maize/yams were evaluated in 6 trials on different farms of the Betulia area (Sucre, Colombia) through a farmer/Instituto Colombiano Agropecuario/CIAT collaborative project. Cassava yields were markedly lower in all associated systems than in monoculture. A cassava cv. x yams interaction was observed. In associated crops, higher cassava yields and lower yam yields were obtained when Venezolana was planted than with M Col 1684, which is less vigorous. The av. yields of M Col 1684 in monoculture (21.9 t/ha) were higher than those of Venezolana and the regional av. (8.0 t/ha). Yields of CM 342-170 were highly unstable and root DM content was lower. M Col 1684 is recommended for monocropping systems in the region and for animal nutrition, and Venezolana for both monocropping and associated systems. The latter cv. has excellent root quality, but is susceptible to poor soils. The economic analysis of these expt. indicated that M Col 1684 was the most profitable cv. on 4 of the 6 farms when roots were sold for fresh consumption. In general, cassava monocrops appear to have more economic stability than associated systems, mainly due to the yam component in the latter. (CIAT)

0336

27665 MARISCAL, A.M. 1984. Major constraints of cassava production in the Philippines. Radix 6(1):13-14. En., 11 Ref. [Philippine Root Crop Research & Training Center, Visayas State College of Agriculture, Baybay, Leyte 7127-A, Philippines]

Cassava. Production. Cultivation. Technology. Philippines.

The major factors limiting cassava production in the Philippines are briefly discussed. These include subsistence farming, infertile areas for cassava, poor production practices, inappropriate research-generated

technologies, slow technology transfer, unadopted technologies, and postharvest and processing problems. These factors are summarized as being biophysical (var., pests, management practices, cropping system, and soils) and socioeconomic (ignorance, credit, input availability, economic behavior, market, superstition, and tradition). (CIAT)

0337

26140 MESTRA G., A.; GONZALEZ A., G. 1984. La evaluación de un proyecto de producción de yuca con crédito asociativo. (Evaluation of a cassava production project with associative credit). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.29-36. Es.

Cassava. Production. Planting. Cultivars. Weeding. Injurious insects. Harvesting. Costs. Labor. Developmental research. Cassava programs. Colombia.

The associative type of credit was evaluated on the basis of the 1st experiences obtained in 1983-84 with the cassava natural drying plant APROBE (16 associated cassava producers) located in Betulia (Sucre, Colombia). The project covered 53 ha and technical assistance was provided. The economic evaluation indicated that cassava yields were 40 percent below the expected level (8.3 vs. 14.0 t/ha), resulting in an economic loss. To correct deficiencies encountered in this project, the following recommendations were made: (1) initiate a plan to produce high-quality, disease- and insect-free planting material; (2) select lots of healthy seed and reserve them as planting material; (3) store planting material for no longer than 2 mo. and treat this material prior to storage; (4) make an agroeconomic evaluation of cassava/maize association thus reducing investment risks; and (5) complement agronomic studies with production/processing studies. (CIAT)

0338

26803 MOONGA, R.M.; CHALABESA, A. 1985. Outline paper on situation of roots, tubers and plantains in Zambia. In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantain in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.260-266. En.

Cassava. Production. Cassava programs. Legal aspects. Prices. Marketing. Developmental research. Zambia.

The situation of cassava and other subsistence crops in Zambia is described. No accurate data are available but in a survey conducted in 1977, it was estimated that 70 percent of the farmers had cassava fields (approx. 371,000 households). Cassava yields in Zambia are among the lowest in the world (approx. 6 t/ha in 2-3 yr) and per capita consumption has decreased by 25 percent, attributed to the lack of early maturing, disease- and pest-resistant var., poor cultural practices, and the absence of processing technology and marketing facilities. Other production constraints are the high labor requirements and prices and the lack of incentives. Research work carried out at Mausa Regional Station is briefly discussed. (CIAT)

0339

26761 MUSLIM, H.; KUNARTO. 1985. Kebijaksanaan pembangunan daerah, khususnya mengenai sektor industri dan industri pertanian dalam Pelita. (Government policies for regional development, especially for the industrial and agroindustrial sectors in Pelita IV). In Nugroho, W.H.;

Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.30-47. In., Sum. In., En.

Cassava. Cassava programs. Factories. Legal aspects. Statistical data. Production. Indonesia.

In East Java, one of the aims of industrial development is the use of agricultural products for industrial purposes. The manufacture of tapioca and other cassava products in Indonesia is not as developed as that of rice or maize. In 1983-84 East Java produced 3,472,000 t cassava and only 8 percent was destined for industrial use due to the lack of industries that use cassava as a raw material. (AS)

0340

26795 NIGERIA. FEDERAL DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT. 1985. Situation report on roots, tubers and plantains in Nigeria. In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2.pp.127-138. En.

Cassava. Marketing. Prices. Socioeconomic aspects. Cassava programs. Developmental research. Plant breeding. Legal aspects. Nigeria.

The situation on roots, tubers, and plantains in Nigeria is described. In this country, where the oil sector predominates, agriculture represents 22 percent of the gross national product and engages approx. 55 percent of the labor force. Eleven million t of cassava are produced per year on 0.93 million ha. There is no organized marketing system for cassava; its commerce is mainly the responsibility of women. Among technical and social constraints to cassava production are the small size of farms, multiple cropping systems, pests and diseases, low soil fertility, lack of improved planting material, and deficient extension services. The National Root Crops Research Institute and International Institute for Tropical Agriculture have developed high yielding var. (up to 30 t/ha). On the other hand, small-, medium-, and large-scale processing techniques have not been adequately promoted. (CIAT)

0341

26758 NUGROHO, W.H.; GURITNO, B.; UTOMO, W.H.; SUGITO, Y., eds 1985. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. (Proceedings of the Cassava Development Seminar in East Java, Indonesia). Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. 294p. In., Il.

Cassava. Cassava programs. Socioeconomic aspects. Factories. Mechanization. Industrial machinery. Trade. Intercropping. Distribution. Costs. Prices. Processed products. Fresh products. Storage. Feeds and feeding. Cultivars. Production. Indonesia.

A seminar on the development of cassava in Indonesia took place in East Java in Nov. 1985. This seminar was sponsored by the Research Centre for Tuber Crops of Brawijaya U., with the cooperation of several national and international institutions. Areas covered included: socioeconomic problems and research priorities for cassava development in Indonesia; current and future trends in the cassava world market; governmental policies for regional development; role of cassava in the commercial sector of East Java; potential and perspectives of cassava development; use of cassava for industrial purposes and as animal feed. Monocropping, intercropping, and postharvest technologies are also discussed, as well as research problems for cassava development in East Java. Some conclusions and suggestions are

given. Individual papers are found in this publication under the following consecutive no.: 0264 0270 0301 0315 0331 0339 0344 0350 0357 0370 (CIAT)

0342

28180 OKOLI, O.O.; HAHN, S.K.; OTOO, J.A.; ELEJE, I. 1986. Potential contribution of root crops to the national goal of self sufficiency--a revised national plan. Umudike, Nigeria, National Root Crops Research Institute. 9p. En., 1 Ref. Paper presented at the 4th Joint NAFPP Workshop, Ibadan, Nigeria, 1986. [National Root Crops Research Inst., Umudike, Umuahia, Nigeria]

Cassava. Productivity. Consumption. Cassava programs. Nigeria.

Background information is given on the national plan to improve root crop production, including cassava, in Nigeria. Root crop produotion constraints can be technical, infrastructural, social, or environmental in nature. The roles that national agencies (federal government, National Seed Service, National Cassava Centre, and state ministries of agriculture) play to achieve increased root crop productivity are briefly outlined. The short-term (1986-87) program for enhanced cassava production is presented; it emphasizes the planting of high yielding, early maturing var. and the increment in planted area. The benefits expected from this approach are indicated. (CIAT)

0343

26139 OSPINA P., B. 1984. El funcionamiento y evaluación económica de las plantas de secado natural de yuca en la campaña 1983-84. (Operation and economic evaluation of the cassava natural drying plants during 1983-84). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp.1-26. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Drying. Factories. Industrial machinery. Development costs. Costs. Labor. Productivity. Dried roots. Developmental research. Colombia.

The operation and economic evaluation of the 7 cassava natural drying plants, established on the Colombian Atlantic Coast, are described for 1983-84. With a total drying floor area of 4000 square meters, 2395 t fresh cassava were processed to produce 946 t dry cassava (2:53:1). The av. occupation of the plants was satisfactory; those affected by rains and mechanical damages showed less than 90 percent occupation. The main problems faced by the plants in terms of infrastructure, equipment, and tools, as well as those relevant to farmer organization and institutional support, were assessed. The economic evaluation covered operational costs (maintenance, administration, labor, fuel, transportation, raw material, banking costs, and others) and an analysis of the economic profitability of each plant. The price paid for fresh cassava was the main factor determining both operating costs and profitability. Increasing the installed capacity of the plants would improve the economic results, but only if the plants operate at over 90 percent occupation efficiency. Training of plant management appears to be critical for efficient plant operation. Cassava var. of inferior quality (reduced DM) should have a reduced price. In general, cassava natural drying was highly profitable under the prevailing conditions. (CIAT)

0344

26765 P.T. SARI TANI NUSANTARA. INDONESIA. 1985. Pengalaman PT Sari Tani Nusantara sebagai pengelola ubi kayu dalam usaha menunjang pembangunan industri pertanian. (Experiences of PT Sari Tani Nusantara regarding cassava processing in an effort to develop agroindustries). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.107-115. In., Sum. In., En.

Cassava. Developmental research. Factories. Processed products. Food products. Costs. Prices. Paper industry. Fructose. Maltose. Glucose. Pellets. Indonesia.

P.T. Sari Tani Nusantara, which is located in Karangsuka (Malang, East Java) is one of the PMDN that processes cassava, producing (1) flour for human consumption, (2) flour for paper industry, (3) maltose and fructose syrup, (4) glucose powder, and (5) pellets. P.T. Sari Tani Nusantara requires about 14,060 t fresch cassava/mo. (about 140,600 t/yr). Problems faced by Sari Tani are the quantity, quality, and price of cassava tubers. (AS)

0345

26794 RAKOTONDRABE, P.; RAMAROSON, I. 1985. Situation du secteur des racines et tubercules a Madagascar. (Situation of root and tuber crops in Madagascar). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.121-126. Fr,

Cassava. Marketing. Processing. Prices. Socioeconomic aspects. Cassava programs. Developmental research. Legal aspects. Madagascar.

The situation of root and tuber crops in Madagascar is analyzed. These products account for 22 percent of the total cultivated land and 50 percent of the total food production. A total of 336,125 ha are planted to cassava; production reaches 2,047,160 t (1,929,472 t for human consumption and 381 t for export tapioca) and yields are only 6.09 t/ha. Tapioca and starch factories used 4970 t cassava in 1984; however, commercialization of fresh cassava tubers is low (5 percent). Approx. 10 percent of the total cassava production is sold as peeled, sun-dried tubers, of which 115,800 t were used for animal feeding in 1978 and 317,778 t in 1984. The need to maintain the fertility of arable lands is stressed. In Marovitsika, yields of 20-40 t/ha (with fertilization) were obtained when 2 successive cassava crops were followed by a grass-legume association, which was later used as green manure. The national plan for 1986-90 gives equal priority to cassava as to export crops. (CIAT)

0346

26778 RAMANATHAN, S.; ANANTHARAMAN, M.; LAKSHMI, K.R. 1985. Predictive configuration of the knowledge of farmers about improved methods of cassava cultivation. Annals of Tropical Research 7:39-47. En., Sum. En., 3 Ref. [Central Tuber Crops Research Inst., Sreekariyam, Trivandrum-695 017, India]

Cassava. Cassava programs. Socioeconomic aspects. Technology evaluation. India.

Ninety cassava farmers were interviewed from 9 villages of Trivandrum taluk (Kerala, India) to determine the configuration of characteristics which would differentiate farmers with a low level of knowledge from those with a high level of knowledge. Results indicate that most farmers characterized by nonparticipation in the Lab to Land program, young age (less than 35

yr), a low educational level (less than 8 yr formal schooling), nonavailed credit, and a small area planted to cassava (less than or equal to 1 ha) probably possess a low level of knowledge. Moreover, the aforementioned configuration of characteristics should be used as a criterion in the selection of farmers who will undergo training on improved methods of cassava cultivation. This will greatly help in bridging the knowledge gap and in orienting the cassava training programs toward the need-based target group of farmers. (AS)

0347

28323 REGIONAL WORKSHOP ON ROOT CROPS PRODUCTION AND RESEARCH IN THE CARIBBEAN, GUADELOUPE. 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. 236p.. En., Il.

Cassava. Production. Socioeconomic aspects. Costs. Prices. Statistical data. Cassava programs. Marketing. Caribbean.

In July 1985 a regional workshop on cassava was held in Guadeloupe to identify and define common regional constraints to root crop development, evaluate the potential for further development of root crops in the region, and develop a program for regional network activities. Individual country reports presented discuss the role of the different root crops in the country's agricultural economy, socioeconomic characteristics of root crop farmers, production and marketing, government policies, and research and training activities. Papers presented are recorded individually in this publication under the following consecutive no.: 0196 0291 0293 0295 0298 0299 0305 0306 0307 0309 0310 0334 0351 0354 0355 0358 0363 (CIAT)

0348

26153 REYES, J.A. 1984. Capacitación en producción y procesamiento de yuca. (Training in cassava production and processing). In Best, R., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. pp. 121-126. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Training. Production. Processing. Cassava programs. Developmental research. Technology evaluation. Colombia.

The interinstitutional accomplishments reached since 1981 by the Integrated Rural Development program/Canadian International Development Agency-CIAT collaborative project on cassava drying on the Colombian Atlantic coast are reported regarding training on cassava production and processing. Future training components are briefly described: participation of project technicians in CIAT cassava production and drying courses; regional courses on cassava production and/or establishment and operation of natural drying plants; technical seminars on specific topics; cassava production and processing training courses for farmer associations operating drying plants; and follow-up and evaluation meetings. (CIAT)

0349

23166 REYES, J.A.; DOMINGUEZ, C. 1983. Actividades de capacitación. (Training activities). In Gómez, G., ed. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. Segundo informe julio 1982-mayo 1983. Cali, Colombia, Centro Internacional de Agrioultura Tropical. Proyecto Cooperativo DRI/ACDI-CIAT. pp.38-44. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Training. Cassava programs. Developmental research. Cultivation. Drying. Technology evaluation. Technology transfer. Legal aspects. Production. Colombia.

A brief account is given of 2 training courses conducted on cassava production and processing offered on the Colombian Atlantic Coast to professionals and technicians of the cassava agroindustrial development collaborative project (Integrated Rural Development program (DRI)/Canadian International Development Agency-CIAT). The following recommendations resulted from these courses: projects for certified cassava seed production by the Instituto Colombiano Agropecuario (ICA) should be elaborated; ICA-CIAT collaborative research to identify improved cassava cv. suitable for local production conditions should be expanded; trials aimed at extending the drying period of cassava during the rainy season should be conducted; and training activities should be evaluated. (CIAT)

0350

26760 ROCHE, F.C. 1985. Situasi pasar dunia ubi kayu di masa sekarang dan mendatang. (Present and future trends of the cassava world market). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.18-29. In., Sum. En., Il.

Cassava. Trade. Prices. Socioeconomic aspects. Processed products. Food products. Consumption. Statistical data. Costs. Production. Maps. Indonesia.

About 70 percent of the world production of cassava is used as food and only 16 percent is marketed as gaplek (chips and pellets), CF, and other processed forms on the world market. Thailand is the greatest exporter of cassava. Indonesia plays a relatively small role. Because of the price policy of the EEC, the price of maize and barley was so high in the 1970s that the demand for gaplek in EEC countries increased. This resulted in increased acreage and total cassava production in Thailand; in Indonesia, however, production did not increase. The world price of cassava (gaplek) fluctuates from year to year, influenced by factors such as (1) demand fluctuation of Thai cassava, (2) transportation costs in EEC countries, and (3) the price of maize/barley in EEC countries. Considering the high governmental expenditure of the EEC countries for the support of the Common Agricultural Policy, it is possible that in the next 3-4 yr this policy will change. The price of cassava will probably fall; however, the high cost of processing must be offset by low farm production costs. (AS)

0351

28336 RODRIGUEZ DE PAREDES, M. 1986. Raíces y tubérculos en República Dominicana. (Root and tuber crops in the Dominican Republic). In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.123-133. Es., Sum. En. [Centro Norte de Desarrollo Agropecuario, La Herradura, Apartado 700, Santiago, República Dominicana]

Cassava. Consumption. Statistical data. Production. Root productivity. Marketing. Cassava programs. Dominican Republic.

The supply and demand of cassava, yam, sweet potato, cocoyam, and potato in the Dominican Republic are analyzed; cultivated land characteristics and availability, farmers' socioeconomic profile, cropping systems, yields, production costs and constraints, and required labor are indicated. Cassava is grown in association with beans, yams, sweet potato, and maize. Of the total cassava production 95 percent is consumed fresh; only 2-3 percent is

processed into casabe. Rejects are given to animals. Government policies are also reviewed and research and training objectives are indicated. A national cassava course was held with CIAT's collaboration. (CIAT)

0352

26307 ROMANOFF, S. 1986. Estimativos del apoyo institucional para las empresas campesinas productoras de yuca seca en la Costa Atlántica. (Estimates of the institutional support given to peasant enterprises producing dried cassava on the Atlantic Coast). In Best, R.; Ospina P., B., comp. El desarrollo agro-industrial del cultivo de la yuca en la Costa Atlántica de Colombia. Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de secado natural de yuca período julio 1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultural Tropical. Proyecto Cooperativo DRI-CIAT. v.2, pp.2-14. Es., 3 Ref. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Factories. Drying. Costs. Statistical data. Developmental research. Colombia.

The efforts and institutional expenditures required to establish 7 cassava natural drying plants in Sucre (Colombia) from 1981 to 1984 are quantified. The annual changes in expenditures, expenses incurred by various institutions, and the relative importance of several types of expenditures are analyzed. Of the estimated institutional investment, 31 percent was alloted to studies, 16 percent to technical assistance, 13 percent to training courses, and only 12 percent to investments and working capital. While expenses to support the individual plants decreased from 1981 to 1984, these were too high considering the sales vol. of the plants. The results show the need to (1) establish an effective system to monitor program expenses; (2) evaluate project impact on beneficiaries; (3) conduct cost/benefit studies including cost figures of institutional support; (4) plan and rationalize the institutional support that will be required by the project to expand cassava drying plants in the region and elsewhere in Colombia. (CIAT)

0353

26799 RWANDA. MINISTERE DE L'AGRICULTURE, DE L'ELEVAGE ET DES FORETS. 1985. Situation des racines, tubercules et bananes plantains au Rwanda. (Situation of roots, tubers, and plantains in Rwanda). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.196-216. Fr.

Cassava. Marketing. Harvesting. Processing. Cultivars. Prices. Productivity . Statistical data. Cassava programs. Developmental research. Rwanda.

The situation of root, tuber, and plantain crops in Rwanda is described. Since 1982 the government has agreed to give priority to the production of foods, with a strategy that includes inputs, promotion of food and animal products, anti-isolationist policies, and the establishment of regional exchanges and of food security stocks. Cassava is cultivated throughout the count., as a between-harvest crop on a total of 45,451 ha and with a total annual production of 500,514 t. The av. yield is 11 t/ha. Bitter cassava var. EALA 07 yields up to 20 t/ha at the Institut des Sciences Agronomiques du Rwanda. Research goals and cultivation constraints for cassava are given. (CIAT)

0354

28339 SEESAHAI, A. 1986. Root and tuber crops in Trinidad and Tobago. In Regional Workshop on Root Crops Production and Research in the Caribbean,

Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.169-183. En., Sum. Es., 12 Ref. [Ministry of Agriculture, Crop Research Division, No.10 Caroni North Bank Road, Centeno, Trinidad]

Cassava. Production. Statistical data. Marketing. Costs. Prices. Socioeconomic aspects. Cassava programs. Trinidad and Tobago.

The supply and demand of root and tuber crops and their products in Trinidad and Tobago are analyzed; in this country, cassava and Colocasia esculenta var. esculenta are the main root crops grown. Aspects covered are characteristics of cultivated land, cropping systems, yields, socioeconomic profile of farmers, production vol., costs, and constraints, and marketing. Government policies on the importation of energy-rich agricultural products, domestic subsidies, import and export tariffs, credit, and production incentives are given. Regarding the future research on cassava, emphasis will be placed on the collection, multiplication, and selection of local and foreign germplasm and the introduction and agronomic evaluation of local and CIAT cv. Studies will be conducted on intercropping systems, CBB, storage systems, harvest mechanization, and physiological factors controlling yield. (CIAT)

0355

28327 SERANO, S. 1986. Root and tuber crops in Belize. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.31-35. En., Sum. Es., 3 Ref. [Ministry of Natural Resources, Agricultural Station, Stanin Creek, Belize]

Cassava. Production. Marketing. Prices. Cassava programs. Belize.

Since the cultivation of root and tuber crops in Belize is primarily at the subsistence level, there are no available data on research, production, and demand. Several data are presented on area sown, cropping systems, and socioeconomic profile of the farmers. Finally, the marketing of root crops and the factors affecting price fluctuation are analyzed and discussed. (CIAT)

0356

28325 SMITH, L.S.; SWANN, G.; RICHARDSON, K. 1986. Root and tuber crops in the Bahamas. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.7-18. En., Sum. Es. [Dept. of Agriculture, P.O. Box N-3028, Nassau, Bahamas]

Cassava. Production. Root productivity. Statistical data. Prices. Costs. Legal aspects. Cassava programs. Bahamas.

The supply, availability, and characteristics of cultivated land, cropping systems, yields, socioeconomic profile of producers, production vol., costs, and constraints, and the marketing of root and tuber crops in the Bahamas are analyzed. The internal and external demand of fresh products and their limitations are also discussed. Finally, the government policies related to root crop production are given, and research, training, and development activities are indicated. (CIAT)

0357

26759 SOEJONO, I. 1985. Masalah sosial-ekonomi dan prioritas penelitian pada pengembangan ubi-kayu di Indonesia. (Socieconomic problems and research priorities of cassava development in Indonesia). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di

Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.1-17. In., Sum. In., En., 8 Ref.

Cassava. Cassava programs. Socioeconomic aspects. Prices. Costs. Root productivity. Indonesia.

Almost 80 percent of the total production of cassava in Asia comes from Thailand, Indonesia, Philippines, and Malaysia. Compared with Thailand or Malaysia, cassava production in Indonesia is lower. Although it is possible to increase its production in Indonesia, price fluctuation makes it difficult as well as the competition with other crops which can substitute cassava. Therefore, an effort should be made to reduce the cost/unit yield of cassava. (AS)

0358

28329 SORHAINDO, C.A. 1986. Root and tuber crops in Dominica, West Indies. In Regional Workshop on Root Crops Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.43-50. En., Sum. Es. [Ministry of Agriculture, Botanic Gardens, Roseau, Dominica]

Cassava. Production. Marketing. Statistical data. Cassava programs. Dominica.

An analysis is made of both the land available for 6 root crops--Colocasia esculenta, Xanthosoma sagittifolium, yam, sweet potato, cassava, and white potato--and the land potential for crop expansion, estimated to be 50 percent over the next 4 yr. Farm characteristics and cropping systems involving these crops are also described. The production costs of these crops are considered high, and therefore restrict their demand. Likewise, the major constraints on domestic and external demand are considered, and the future policy directions that should be followed to counteract these restrictions are discussed. Finally, the role that the research institutions can play in greater crop development is discussed. At the community level, cassava is processed into farina. (CIAT)

0359

27690 STUART, A. 1985. Burgeoning tapioca project at Nakhon Ratchasima. Far Eastern Agriculture. March-April 1985:14-16. En., Sum. En., Il.

Cassava. Cassava programs. Industrialization. Thailand.

The success of a CF and hard pellet production enterprise in Nakhon Ratchasima, Thailand, is reported. The private project, developed by Chao Phya Co Ltda., has 3 cassava plants: CPY 1 in Nakhon Ratchasima can produce 3000 MT hard cassava pellets and 200 MT CF/day; CPY 2 and CPY 3 process cassava from the provinces of Suphan Buri, Kanchanaburi, and Ratchaburi, and produce hard pellets from chips. (CIAT)

0360

19555 TAZELAAR, R.J. 1981. Cassave en de eeg: recente ontwikkelingen en toekomstperspectief op gebruik. (Cassava in the EEC: recent developments and future trends on utilization). In Asseldonk, J.S.O Van; Box, L., eds. Cassave of tapioca? Verslag van het Symposium Recente Ontwikkelingen in Onderzoek en Gebruik van Cassave, Amsterdam, 1981. Amsterdam, Stichting Onderzoek Wereldvoedselvoorziening. pp.44-52. Nl.

Cassava. Marketing. Production. Consumption. Socioeconomic aspects. Netherlands.

The need of a common agricultural policy to enable the establishment and

continuation of one communal market and for European integration is discussed. Emphasis must be placed on market and price policies from which the different European market organizations result. The restriction of imports of substitutes, including cassava, as a consequence of the choice for an integrated Europe, is analyzed. Although the problems with cassava has been solved, the problems with other substitutes continue to exist. Since 1956 there has been an enormous increase of the yields/ha and consumption of cereals can be expected to be more or less constant. This means that in the future the actual situation of subsistence could become one of structural surpluses. To avoid disruption in the EEC, measures have to be taken regarding the import of substitutes, such as acceptable cereal policies, frontier actions, or bilateral agreements (e.g. in the case of Thailand). (CIAT)

0361

26790 TETEBO, R. 1985. Workshop on production and marketing constraints on roots, tubers and plantains in Ghana. In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.89-93. En.

Cassava. Production. Cultivation. Rainfall data. Developmental research. Cassava programs. Ghana.

Basic information is presented on climate, ecological zones, soil types, land use patterns, and agricultural production areas of Ghana, where root crops are the basic staple foods. Cassava is cultivated throughout the country, especially in the transition zones and savannas, and its is harvested the year-roud. Major production constraints of these foods are the growing food shortage, high costs of agricultural labor and inputs, low prices paid for products, poor conditions of highways, and the lack of foreign currency, planting materials, and well-accepted var. The production of starchy crops decreased from 8.0 to 4.4 million t. The production of cassava and cassava by-products has increased due to its adaptability. On the other hand, processing methods for cassava are rudimentary. Although some breeding and selection work has been done since 1930, diseases and pests cause substantial losses to this crop. (CIAT)

0362

26801 TOUGNON, K. 1982. Situation du secteur des racines, tubercules et plantains au Togo. (The situation of the root, tuber, and plantain sector in Togo). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.228-247. Fr., Il.

Cassava. Marketing. Prices. Processing. Socioeconomic aspects. Statistical data. Cassava programs. Developmental research. Legal aspects. Togo.

Climatic and ecological data of Togo are given and the situation of root, tuber, and plantain crops in the country is described. In 1975 the Institut National des Plantes a Tubercules was founded to promote the production of cassava and other starchy crops. Cassava and yams, with an annual growth rate of only 1.5 percent are regarded as between-harvest substitutes for basic cereals. The commercialization system, which is of a private nature, dynamic, and effective, is described, and the major produotion constraints are discussed. (CIAT)

0363

28333 TREMBLAY, A.; PIERRE-JEAN, L. 1986. Les racines et tubercules en Haiti. (Root and tuber crops in Haiti). In Regional Workshop on Root Crops

Production and Research in the Caribbean, Guadeloupe, 1985. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.81-99. En., Sum. En., Es., 21 Ref.

Cassava. Production. Statistical data. Costs. Consumption. Marketing. Processing. Trade. Research. Cassava programs. Haiti.

The existing data on production and consumption of sweet potato, cassava, yam, potato, taro, and arum crops are presented to provide basic elements with which the problems of these crops in Haiti can be analyzed. Ecosystems in which they are grown, farm characteristics, required labor, cropping systems, and production costs, vol., and constraints are indicated. The processing and marketing of the products, the domestic demand for fresh and processed products, and their constraints are also discussed. It should be noted that these crops are consumed only locally. Government policies are analyzed and the institutions, personnel, training, and budget involved in research are described. Finally, some recommendations on an approach toward research are made. (CIAT)

0364

26715 UENO, L.H.; WIESEL, P.A. 1984. Comercializacao de mandioca de mesa na cidade de Sao Paulo, 1970-79. (Commercialization of cassava for human consumption in the city of Sao Paulo, 1970-79). Sao Paulo-SP, Brasil, Instituto de Economia Agrícola. Relatorio de Pesquisa no.2. 14p. Pt., Sum. Pt., 10 Ref., Il.

Cassava. Economics. Trade. Distribution. Costs. Prices. Consumption. Brazil.

The seasonal variations in wholesale and retail prices of cassava for human consumption and the amount of cassava on offer in the wholesale market of the Companhia de Entrepostos e Armazén Gerais de Sao Paulo (Brazil) were analyzed. Likewise, the retail commercialization trends were analyzed and the seasonal markup pattern was determined. The data used for the analysis corresponded to the period 1970-79. Variance analysis indicated that the seasonal indexes determined for the tested variables were significative and well-defined patterns were observed. During the test period no benefit trend was observed. The policy of unrestricted benefit and markup adopted by the retail merchants regarding cassava commercialization has been moderated. (AS-CIAT)

0365

24742 UNIDAD REGIONAL DE PLANIFICACION AGROPECUARIA. 1985. Cultivo de yuca. (Cassava cultivation). In Diagnóstico agropecuario de Sucre. Sucre, Proyecto PNUD/FAO/COL 83/012. pp.285-294,365-367. Es., 29 Ref., Il.

Cassava. Production. Root productivity. Statistical data. Costs. Consumption. Prices. Colombia.

General economic data on the evolution of cassava cultivation in the dept. of Sucre, Colombia, for the period 1970-83 are presented, with a general indication of production systems and problems. Data on area planted, production, yields, production costs, credits, profitability, and consumption, and on some of their interrelationships are given. The main problems limiting cassava production improvement are inadequate cultural practices and low-quality seed. If these problems are resolved through improved technology, the crop could be promising. (CIAT)

0366

24744 UNIDAD REGIONAL DE PLANIFICACION AGROPECUARIA. COLOMBIA. 1985. Sector agrícola. (Agricultural sector). In Diagnóstico agropecuario del Meta.

Villavicencio, Proyecto OPSA/FAO/PNUD/COL 83/012. pp.106-115, 124-125, 131-132, 229-231. Es., 37 Ref., Il.

Cassava. Production. Root productivity. Costs. Prices. Consumption. Statistical data. Colombia.

The agricultural performance of the dept. of Meta, Colombia, is described for the period 1978-84, based on area harvested and credits provided to farmers; cassava is included within the main crops produced. The potential cassava production is estimated to be 139,500 t with av. yields of 9 t/ha. The 2 main problems faced by cassava producers are the increasing labor costs and the manipulation to which they are subject by middlemen. (CIAT)

0367

24743 UNIDAD REGIONAL DE PLANIFICACION AGROPECUARIA. COLOMBIA. 1985. Subsector agrícola: yuca. (Agricultural subsector: cassava). In Diagnóstico agropecuario del Cesar. Cesar, Proyecto PNUD/FAO/COL 83/012. pp.143-151, 179, 182, 188-195, 248-251. Es., 40 Ref.

Cassava. Economics. Root productivity. Costs. Prices. Statistical data. Cultivars. Colombia.

The status of cassava in the dept. of Cesar, Colombia, is described regarding its importance, production, and yields (1976-82), technology, credit, and profitability (costs, prices, and economic results). A comparative balance is made of the profitability of the major food crops (beans, cassava, plantain, and maize) in table form. The regional balance on production and consumption of several food crops during 1981-82 indicated that Cesar is self-sufficient in cassava production and produces surplus. Data are also included on the apparent national consumption of crops produced in the dept. during 1980 and 1981. (CIAT)

0368

26165 UNITED NATIONS. ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN. 1984. Crops: area, production, yield; data series: 1974-1983: cassava. Agricultural Statistics 6:59-61. En., Fr., Es.

Cassava. Statistical data. Production. Timing. Root productivity. Developmental research. Caribbean.

Data on cassava area, production, and yields/yr for the period 1974-83 are provided in table form for the 16 countries that are members of the Caribbean Development and Cooperation Committee as of Dec. 31, 1983. The sources from which the information was obtained are listed. (CIAT)

0369

28116 URFF, W. VON 1985. Umsetzungsdefizite swischen forschung und praxis. (Losses occurring during the transition from research to practice). Entwickling und Landlicher Raum 19(6):7-10. De., Sum. De., En., Il.

Cassava. Research. Productivity. Technology evaluation.

Changes in yields between 1969-71 and 1981-83 of several food crops (among them cassava) are tabulated for Africa, Latin America, and Asia. Divergences were observed between yields obtained in research and those obtained in practice due to breeding for crop species for areas with fertile soils and favorable climatic conditions and to available production technology. Other causes of yield discrepancies are mentioned. (CIAT)

0370

26773 WIDODO, Y.; BROTONEGORO, S. 1985. Masalah penelitian dalam usaha pengembangan ubi kayu di Jawa Timur. (Research problems in developing cassava in East Java). In Nugroho, W.H.; Guritno, B.; Utomo, W.H.; Sugito, Y., eds. Seminar Pengembangan Ubi Kayu di Jawa Timur, Indonesia, 1985. Prosiding. Malang, Pusat Penelitian Tanaman Ubi-Ubian Universitas Brawijaya. pp.238-250. In., Sum. In., En., 9 Refs.

Cassava. Developmental research. Root productivity. Cultivars. Fertilizers. Costs. Weeding. Indonesia.

The area planted to cassava in Indonesia is gradually decreasing, while the av. on-farm production is still low, since cassava is not an economically profitable crop. Research results will be meaningless if they are not disseminated and given a practical application. The development of cassava research results is far behind that of other food crops, especially rice and maize. Research results on cassava have not been applied by the farmers, indicated by the use of a local, low-yielding var. and the absence of fertilization and weeding practices. Actual field production at the farmers' level (10 t/ha) differs broadly from that obtained at the research station (over 30 t/ha). These problems represent a challenge to national research institutes. Although the no. of researchers, available funds, and facilities are limited, extension work should be improved and results well disseminated at the farmer level. (AS)

0371

26785 WORKSHOP ON PRODUCTION AND MARKETING CONSTRAINTS ON ROOTS, TUBERS AND PLANTAINS IN AFRICA, KINSHASA, ZAIRE. 1985. Main issues and possible follow-up action. In _____. Rome, Food and Agriculture Organization of the United Nations. v.1, pp.96-99. En.

Cassava. Marketing. Production. Socioeconomic aspects. Consumption. Cassava programs. Developmental research. Africa.

Concepts on main constraints to root, tuber, and plantain production in tropical Africa are discussed. Among them, the lag between food production and population growth, the high rate of migration toward urban centers, and the rise in cereal imports (more than 11 percent per annum) are highlighted. Major production constraints are pests and diseases and socioeconomic factors related to the traditional role of women, who are responsible for producing these staple foods. Major marketing constraints are poor transportation facilities and problems in the recollection, conservation, and distribution of supplies. The economic consequences of these limitations are analyzed and some general remedial actions are suggested. Among these, intercropping and sequential cropping would protect farmers from the risk of failure due to climatic factors and, at the same time, make it possible to expand labor demand to cover most of the year. A further dimension to food security lies in the flexibility of cassava with respect to the harvesting period. (CIAT)

0372

26783 WORKSHOP ON PRODUCTION AND MARKETING CONSTRAINTS ON ROOTS, TUBERS AND PLANTAINS IN AFRICA, KINSHASA, ZAIRE. 1985. Marketing, processing and prices of tubers and plantains in humid tropical Africa. In _____. Rome, Food and Agriculture Organization of the United Nations. v.1, pp.46-69. En., Sum. En.

Cassava. Marketing. Prices. Storage. Distribution. Processing. Processed products. Cassava flour. Gari. Socioeconomic aspects. Cassava programs. Developmental research. Africa.

The situation on root crop marketing in tropical Africa, where cassava consumption prevails, is assessed and different marketing aspects (supply, demand, marketing systems, prices, storage and processing problems) are summarized. Production appears to be relatively stable, with a growth rate of 2 percent per annum, mostly for household consumption. The av. marketing rate for cassava reaches 40-50 percent near the cities. The changes in the migrants' eating habits are described and the observation is made that urban consumption depends on the comparative prices of starchy staples and their substitutes. In most countries, a decreased urban consumption of cassava is observed. On the other hand, this crop is the least marketed, probably because it can be stored in the ground. Cassava is marketed in processed forms such as sticks, chickwangue, gari, paste, or dry chips. Some characteristics of the nonformal marketing channels, often very organized and with a high degree of adaptability, are discussed. The limitations in the distribution, storage, and conservation of these staple foods are analyzed. Although the price of cassava is similar to that of imported cereals, its price/calorie is 100 percent higher. Finally, several intervention strategies are proposed at the production, price-fixing, and marketing systems levels. (CIAT)

0373

26782 WORKSHOP ON PRODUCTION AND MARKETING CONSTRAINTS ON ROOTS, TUBERS AND PLANTAINS IN AFRICA, KINSHASA, ZAIRE. 1985. Trends in production and consumption of roots and plantains in Africa and their contribution to food security. In _____. Rome, Food and Agriculture Organization of the United Nations. v.1, pp.23-45. En., Sum. En.

Cassava. Socioeconomic aspects. Production. Consumption. Statistical data. Cassava programs. Developmental research. Africa.

The production/consumption patterns of traditional crops in 23 African countries during the last decade are examined. Cassava is the root crop most consumed and dominates the production/consumption patterns in Angola, Central African Republic, Congo, Mozambique, Tanzania, and Zaire. Although it is consumed in other African countries, crops like yam and cereals are more important. From 1969 to 1983, the consumption of root crops decreased from 46 to 41 percent and the per capita consumption decreased at a rate of 1.7 percent per annum especially in urban areas, mainly attributable to food availability. In 1981-83, production of these crops averaged approx. 98 million t/yr, cassava accounting for 50 percent of this total. Overall production of cassava increased at a rate of 2 percent/yr and av. yields were 6.9 t/ha, for the same period. In general, production growth has lagged behind population growth in the region as a whole. In the aforementioned countries, cassava shows a more favorable trend and a certain degree of production stability. The demand of cassava for food purposes may grow at approx. 60 percent/yr to reach 63 million t in 1995. To date, the analysis of consumption and production data suggests that the strategy of technological packages for these countries has failed. (CIAT)

0374

26788 YAO KOUASSI, M. 1985. La situation du secteur des racines, tubercules et plantains en Cote d'Ivoire. (The situation of roots, tubers, and plantains in Ivory Coast). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.27-75. Fr., 10 Ref., Il.

Cassava. Marketing. Trade. Prices. Costs. Consumption. Distribution. Postharvest losses. Processing. Intercropping. Pests. Plant breeding. Cassava programs. Developmental research. Legal aspects. Ivory Coast.

The situation of roots, tubers, and plantains in Ivory Coast is evaluated. The participation of these products in total food production decreased from 89.50 to 79.27 percent from 1960 to 1980 due to archaic structures, absence of crop intensification practices and financial mechanisms, self-consumption, and distribution losses. In 1985 the consumption of cassava reached 970,000 t. There is a balance between rural and urban consumption since cassava is produced in both coastal areas and around Abidjan. Cassava is mainly marketed as atieke. Price variation is determined by season and markets. Price margins favor middlemen. Cassava sold at retail levels produces higher gross margins than at wholesale levels (160 vs. 60 percent). Marketing constraints, government policies, some attempts of industrial transformation, and different cassava products are discussed. Priority should be given to var. improvement. (CIAT) See also 0196 0197 0259 0263 0264 0266 0267 0376 0389 0392

K00 OTHER ASSOCIATED COMMODITIES

K01 Rotational Schemes and Intercropping

0375

26815 AGBEDE, O.O. 1985. Improving agroforestry in Nigeria: effect of plant density and interaction on crop production. Forest Ecology and Management 11(4):231-239. En., Sum. En., 7 Ref. [Forestry Research Inst. of Nigeria, P.M.B. 5054, Ibadan, Nigeria]

Cassava. Intercropping. Gmelina arborea. Spacing. Maize. Yams. Root productivity. Forestry. Planting. Nigeria.

The performance of Gmelina arborea, a forest tree crop, and the yields of food crops, among them cassava, as affected by their planting distances and crop combinations when intercropped were investigated in 6 different ecological areas of southern Nigeria. The percentage survival and mean height of G. arborea were not significantly affected by the different planting densities of the forest and the food crop species; however, closely planted cassava (1 x 1 m) tended to reduce the survival of the tree crop. Food crop yields depended greatly ($P = 0.01$) on their planting densities. Marked differences in the yields of food crops occurred among the exptl. sites. (CIAT)

0376

26829 AKACHUKU, A.E. 1985. Cost-benefit analysis of wood and food components of agri-silviculture in Nigerian forest zone. Agroforestry Systems 3(4):307-316. En., Sum. En., 4 Ref. [Dept. of Forest Resources Management, Univ. of Ibadan, Ibadan, Nigeria]

Cassava. Intercropping. Forestry. Income. Costs. Harvesting. Timing. Production. Cuttings. Planting. Labor. Nigeria.

Costs and revenue of agri-silviculture in the Nigerian forest zone were estimated. Two crop combinations were considered: Gmelina arborea, a hardwood species, was interplanted with (a) yam and maize and (b) cassava and maize. Agri-silviculture increases the farmer's income in this zone. The ratios of total cost to revenue are 1:2.3 for (a) and 1:2.4 for (b). When the trees are clear-cut after 5 yr, the ratio of cost to revenue is 1:2.4. Farmer's net incomes are given for the 2 crop combinations and for wood, being greater for (a), followed by wood, and then (b). If 5 percent of the farm families in the area practice agri-silviculture, each family cultivating 1 ha, there will be enough fuel wood after 5 yr of growth. (AS)

0377

26867 CASSETARI NETO, D.; FURTADO, M.J. 1986. Ocorrencia de doencas em mandioca consorciada com culturas de ciclo curto no Espírito Santo. (Disease incidence in cassava associated with short-cycle crops in the state of Espírito Santo). Cariacica-ES, Empresa Capixaba de Pesquisa Agropecuária. Pesquisa em Andamento no.36. 9p. Pt., Il. [Empresa Capixaba de Pesquisa Agropecuária, Caixa Postal 125, 29.154 Campo Grande, Cariacica-ES, Brasil]

Cassava. Intercropping. Diseases and pathogens. Bacterioses. Mycoses. Timing. Rainfall data. Brazil.

Bi-monthly evaluations of intercropped cassava (Pao do Chile) yields as affected by disease incidence were conducted in Itapemirim (Espírito Santo, Brazil) in 1984. The other intercrop components were beans and maize. Intercropping was found to inhibit pathogen dissemination. Tables are presented on pathogen (Xanthomonas campestris pv. manihotis, Colletotrichum gloeosporioides, Cercospora sp., etc.) evaluation criteria, preliminary data on disease incidence, and climatic data. (CIAT)

0378

26880 ENYINNIA, T.; UNAMMA, R.P.A.; NOTTIDGE, D. 1983. Effect of selected herbicides on weeds and yield of maize in yam/maize/cassava inte. crops. In Deat, M.; Marnotte, P., eds. Biannual Conference, West African Weed Science Society, 2nd., Nigeria, 1983. Proceedings. Umudike, National Root Crops Research Institute. pp.195-199. En., Sum. En., 5 Ref. [National Root Crops Research Inst., Umudike, P.M.B. 1006, Umuahia, Nigeria]

Cassava. Weeding. Intercropping. Herbicides. Yams. Maize. Nigeria.

In field trials in Nigeria in 1983, the effects of 5 preemergence herbicides, alone or combined, on yam cv. Akali and cassava cv. TMS 30211 intercropped on ridges with maize cv. TSZR-White grown between the ridges were investigated. All treatments gave satisfactory weed control for up to 70 days after application and none affected maize germination or root crop budding. (AS (extract))

0379

25794 FLORES L., M.; MAGRO T., M. 1985. Efectos del cultivo múltiple y la fertilización en yuca (Manihot esculenta Grantz Var. Tulumayo 2). (Effects of multiple cropping and fertilization on cassava var. Tulumayo 2). Tingo María, Perú. Estación Experimental Agropecuaria. 10p. Es., 5 Re ., Il. Paper presented at Reunión del Programa Nacional de Investigación y Promoción Agropecuária en Selva, 2a., Yurimaguas, Perú, 1985. [Estación Experimental Agropecuaria, Tulumayo, Tingo María, Perú]

Cassava. Intercropping. Maize. Soybeans. Rice. Fertilizers. Root productivity. Xanthomonas. Disease control. Costs. Peru.

Cassava var. Tulumayo 2, intercropped with maize-soybeans and then rice and fertilized with manure, 80-60-0, 80-80-87, or 80-80-29 NPK, was compared with monocropped cassava in terms of commercial root yields and Xanthomonas sp. incidence. While monocropped cassava produced the highest yield (6842 kg/ha) with 3 t manure/ha, multiple crops gave higher incomes with a 75.7 percent profitability compared with 28.8 percent for the monocrop. No significant differences were observed for K rates, but 87 kg K reduced root rots. Also, Xanthomonas sp. incidence was reduced in multiple cropping systems: 22 vs. 32 percent for monocropped cassava. (CIAT)

0380

26856 FRANCIS, C.A. 1985. Variety development for multiple cropping systems. CRC Critical Reviews in Plant Sciences 3(2):133-168. En., 141 Ref., Il. [Dept. of Agronomy, Univ. of Nebraska, Lincoln, Nebraska, USA]

Cassava. Cultivation systems. Cultivars. Genetics. Plant breeding. Selection.

Criteria that should be taken into account to develop crop var. for multiple cropping systems are reviewed on the basis of exptl. work with crops including cassava. Various definitions of multiple cropping and its characteristics are given. Species interactions and genetic diversity and variability within a given species are discussed. Var. maturity, photoperiod and temp. sensitivities, plant morphology, root systems, density response, insect and disease resistance, cv. uniformity, grain quality, and yield stability are considered important genetic traits for multiple cropping systems. The usefulness of approaches to exptl. design such as yield reduction, analysis of variance, correlation analysis, the regression method, and methods of selection are discussed for breeding methodologies for multiple cropping systems. (CIAT)

0381

27383 INSTITUT DE RECHERCHES AGRONOMIQUES TROPICALES ET DES CULTURES VIVRIERES. 1982. Etude d'une rotation culturale comprenant du soja on sol a drainage vertical ralenti. (Study of a crop rotation system including soybean on a soil with slow vertical drainage). In _____. Rapport des Activites en 1982. Guyane. Fiche d'Essai no.13. 10p. Fr.

Cassava. Rotational crops. Root productivity. Soybeans. French Guiana.

Cassava cv. MU 15 yielded 35 t/ha (61 HI) after an 11-mo. growth cycle. Fertility decreased with shorter intervals between crops. After a preceding crop of soybean, rice, or sorghum, cassava yield components were, resp., 5.1, 7.1, and 7.7 roots/cutting; 39.9, 37.9, and 41.0 percent DM; 20.4, 21.5, and 20.0 percent starch; and 530, 280, and 380 g av. root wt. (CIAT)

0382

26810 KUMADA, K.; OHTA, S.; ARAI, S.; KITAMURA, M.; IMAI, K. 1985. Changes in soil organic matter and nitrogen fertility during the slash-and-burn and cropping phases in experimental shifting cultivation. Soil Science and Plant Nutrition 31(4):611-623. En., Sum. En., 13 Ref., Il. [Faculty of Agriculture, Nagoya Univ., Chikusa-ku, Nagoya, Aichi, 464 Japan]

Cassava. Shifting cultivation. Field experiments. Soil fertility. Soil analysis. Timing. Japan.

Changes in pH, OM, and N fertility of soils after forest clearing by burning and during crop cultivation were investigated at the exptl. field for the study of shifting cultivation set up in the forest of Iriomote Island (Okinawa, Japan). The soils were sampled at 6 periods: 1, before forest clearing; 2, immediately before burning; 3, immediately after burning; 4, 5, and 6 at 10, 20, and 30 mo. after burning, resp. Tilled and nontilled and other treatment plots were laid out, and cassava was grown twice. Soil pH rose from periods 1 to 3 or 4, and then decreased. C and N contents, the amounts of mineralizable N, and N mineralization percentages decreased during cultivation. The amounts of humic and fulvic acids increased from periods 1 to 2 and decreased afterwards. An increase in NH4-N due to the soil-burning effect was observed. The changes in the abovementioned parameters during the cultivation period were greater for the 1st layer (0.5 cm) than for the 2nd layer (5-10 cm), and for the tilled plots than for the nontilled plots. The nitrification percentages,

which were originally very low, tended to increase with the rise of soil pH, and became very high after period 3. Out of 11 soil samples taken at period 3, 2 samples at the reburnt spots showed remarkable differences in C and N content, N fertility, and humus composition compared with the others. P-type humic acid was transformed into B or A type by reburning. (AS)

0383

26394 MASON, S.C.; LEIHNER, D.E.; VORST, J.J. 1986. Cassava-cowpea and cassava-peanut intercropping. 1. Yield and land use efficiency. Agronomy Journal 78(1):43-46. En., Sum. En., 24 Ref., Il. [Dept. of Agronomy, Univ. of Nebraska, Lincoln, NE 68583, USA]

Cassava. Intercropping. Cowpea. Groundnut. Root productivity. Dry matter. Harvesting. Colombia.

Cassava, cowpea, and peanut were grown as sole crops and as intercrops on a Typic Dystropept soil in Santander de Quilichao, Colombia, in 1981 and 1982 to determine land use efficiency, yield, and yield components for each crop. Cassava yields were reduced 2.3-4.7 Mg/ha when intercropped with cowpea or peanut, except in 1982 when intercropped with cowpea. Cassava yield reductions due to intercropping were associated with the production of 1.5-3.9 fewer storage roots/plant than were produced by sole-cropped cassava. When intercropped with cassava, cowpea seed yields were reduced from 3195 to 2170 kg/ha in 1981, and from 2227 to 1328 kg/ha in 1982. Averaged across years, peanut seed yield was reduced from 2099 to 1293 kg/ha. Cowpea and peanut yield reductions due to intercropping were associated with the production of approx. 3.5 fewer pods/plant. Even though yields of component crops were reduced by intercropping, the cassava-cowpea and cassava-peanut intercropping systems resulted in 15-35 percent greater land use efficiency for the 11 mo. growing season than resulted from the sole cropping systems. This is of importance in developing countries where available per capita arable land is low. (AS)

0384

26395 MASON, S.C.; LEIHNER, D.E.; VORST, J.J.; SALAZAR, E. 1986. Cassava-cowpea and cassava-peanut intercropping. 2. Leaf area index and dry matter accumulation. Agronomy Journal 78(1):47-53. En., Sum. En., 14 Ref., Il. [Dept. of Agronomy, Univ. of Nebraska, Lincoln, NE 68583, USA]

Cassava. Intercropping. Cowpea. Groundnut. Leaf area. Dry matter. Starch productivity. Translocation. Root productivity. Growth. Timing. Harvesting. Colombia.

Cassava, cowpea, and peanut were grown in sole and intercropping systems on a Typic Dystropept soil in Santander de Quilichao, Colombia, in 1981 and 1982, to determine the LAI and the DM accumulation of the whole plant and harvestable plant part for each crop. Between 30-65 days after planting, the intercropping systems produced LAI 0.6-1.9 greater than those produced in the cassava sole cropping system. In 1981, the intercropping systems produced LAI that were 0.8-1.0 lower than those of sole-cropped cassava 150 days after planting. The cassava-cowpea and cassava-peanut intercropping systems produced 42-250 g/square meter more DM than did the sole-cropped cassava between 50-105 days after planting. However, DM production at the end of the 11-mo. growing season was similar for intercropping systems and sole-cropped cassava. Intercropping did not influence cassava total plant or storage root DM accumulation at final harvest except when intercropped with peanut in 1982. In this case, a reduction in LAI of 0.8 was associated with production of 4.4 fewer storage roots/plant. These data indicate that rapidly growing cowpea and peanut were able to use space between rows of cassava during the 1st 100 days after planting with min. effect on cassava growth. (AS)

0385

26821 MASON, S.C.; LEIHNER, D.E.; VORST, J.V. 1986. Cassava-cowpea and cassava-peanut intercropping. 3. Nutrient concentrations and removal. Agronomy Journal 78(3):441-444. En., Sum. En., 12 Ref. [Dept. of Agronomy, Univ. of Nebraska, Lincoln, NE 68583, USA]

Cassava. Intercropping. Groundnut. Nutrient uptake. Stems. Leaves. Roots. Timing. Cowpea. N. P. K. Fertilizers. USA.

To determine the influence of intercropping cassava CM 523-7 with cowpea or peanut on nutrient concn. of plant tissue or nutrient removal by the crops, a study was undertaken to (1) compare the nutrient concn. in plant parts of cassava, cowpea, and peanut in intercropping systems to those in sole cropping systems, and (2) determine uptake of N, P, and K of cassava-cowpea and cassava-peanut intercropping systems as compared with the sole cropping systems. Cassava, cowpea, and peanut were grown as sole crops and intercrops on a Typic Dystropept soil in Santander de Quilichao, Colombia, in 1981 and 1982. Intercropping with cowpea resulted in 0.8, 0.6, and 0.3 g/kg lower P concn., and 5.2, 4.9, and 2.9 kg lower N in cassava stems, leaves, and storage roots, than resulted from sole-cropped cassava 50 days after planting. Intercropping had no influence on N, P, and K contents of cassava at later harvest dates. Similar results occurred when cassava was intercropped with peanut, although peanut was a less vigorous competitor for P than was cowpea. The cassava-cowpea and cassava-peanut intercropping systems removed 3.0-7.5 g/square meter more N, 0.30-0.47 g/square meter more P, and 2.5-5.1 g/square meter more K than sole-cropped cassava. Results suggest that these intercropping systems remove more nutrients than comparable sole crops, which leads to more rapid mining of natural soil fertility or the need for higher fertilizer application rates. (AS)

0386

26820 OJENIYI, S.O.; AGBEDE, O.O. 1980. Agronomic assessment of the effect of inter-planting Gmelina arborea with food crops. Turrialba 30(3):290-293. En., Sum. En., Es., 7 Ref., Il. [Cocoa Research Inst. of Nigeria, P.M.B. 5244, Ibadan, Nigeria]

Cassava. Intercropping. Gmelina arborea. Soil fertility. Soil requirements. Root productivity. Nigeria.

The forest tree crop Gmelina arborea was interplanted with yam, cassava, or maize or all 3 together in 5 locations in southern Nigeria. After 2 yr, girth and survival of G. arborea on plots with all 3 food crops or with cassava alone were lower than on plots with yam, maize, or G. arborea alone. The differences were not significant. The yields of cassava from agri-silviculture plots in Benda, Ore, and Gambari were greater (5.6, 1.9, and 8.2 t/ha, resp.) than those from long-cultivated, unfertilized monocropped plots at other sites. (CIAT)

0387

26819 OJENIYI, S.O.; AGBEDE, O.O. 1980. Effect of inter-planting Gmelina arborea with food crops on soil condition. Turrialba 30(3):268-271. En., Sum. En., Es., 7 Ref.

Cassava. Intercropping. Gmelina arborea. Soil fertility. Soil requirements. Analysis. Nigeria.

The forest crop Gmelina arborea was interplanted with yam, cassava, or maize or all 3 together in 3 locations in southern Nigeria. Soil was sampled about 30 mo. after planting. No significant changes in soil fertility indicators or pH were noted; however, a slight reduction in soil

organic C and increases in soil N and P as a result of the simultaneous production of forest and food crops were observed. (CIAT)

0388

26887 OSSENI, B. 1985. Les cultures vivrieres dans les sols ferrallitiques désaturés du Sud de la Cote d'Ivoire a monoculture d'ananas: determination d'un seuil minimum de pH convenable pour quelques cultures. (Food crops on desaturated ferrallitic soils of southern Ivory Coast, cultivated with pineapple in monoculture: determination of the lowest pH limit for several crops). Fruits 40(12):797-805. Fr., Sum. Fr., 9 Ref., Il. [Inst. de Recherches sur les Fruits et Agrumes, 01 B.P. 1740, Abidjan 01 R.C.I., Ivory Coast]

Cassava. Soil requirements. Soil analysis. pH. Rainfall data. Fertilizers. N. P. K. Rotational crops. Groundnuts. Cultivation. Root productivity. Ivory Coast.

Although pineapples grow well in the strongly acid desaturated ferrallitic soils of southern Ivory Coast, yields of most food crops grown in these soils are fairly low. Field expt. were conducted to find the lowest pH limits for some staple food crops of the region. Yams and cassava tolerated pH values more than or equal to 4.5. The pH of soils of East-Comoe is in the range of 4.3-4.5. In these soils, diversification and intensification of agricultural production would require the use of basic amendments to increase the initial pH by at least 1 unit. (AS)

0389

26400 SEGUY, L. 1982. Mise au point de modeles de systemes de production en culture manuelle a base de riz pluvial utilisables par les petits producteurs de la region du Cocais au nord-est du Brésil Etat du Maranhao. (Development of upland rice-based farming system intended for small farmers (hand tool cultivation) in the Cocais area in northeast Brazil, state of Maranhao). Agronomie Tropicale 37(3):233-261. Fr., Sum. Fr., 12 Ref., Il.

Cassava. Cassava programs. Rotational crops. Socioeconomic aspects. Rice. Maize. Root productivity. Cultivars. Statistical data. Groundnut. Brazil.

A method comprising 5 stages is proposed: (1) evaluating the present farming systems used in the Cocais region (Maranhao, Brazil) by small farmers who rarely own their lands and, more generally, the technical and socioeconomic conditions of production; (2) determining the objectives of research to be initiated on farming systems through the joint action of planners, extension officers, researchers, and farmers; (3) working out new farming systems; (4) testing the most suitable combinations, alternatives, and technical models in farms distributed in 4 representative sites of the region; and (5) transferring results to farmers through research-trained technicians. Among others, the rice-cassava and cassava-rice rotations were analyzed as well as the combined rotational cropping system groundnut-rice-maize-cassava and the associated cropping system rice + maize + Vigna + cassava. The av. yields of 3 local cv. (Carga de Burro, Rebenta Burro, and Naja Boi) ranged from 25 to 30 t/ha (without and with fertilizer, resp.) over an 11-mo. crop cycle. Cassava yields greatly depended on weed presence during the 1st mo. The associated cropping system was the most stable over time; rice-cassava and cassava-rice rotations were also attractive. (CIAT)

0390

26380 SILVA, J.F. DA; SILVA, N.G. DA 1984. Controle de plantas daninhas em feijao (Phaseolus vulgaris L.) consorciado com outras culturas. (Weed control in beans associated with other crops). Informe Agropecuario

10(118):70-74. Pt., 20 Ref., Il. [Univ. Federal de Vicosa, 36.570 Vicosa-MG, Brasil]

Cassava. Weeds. Herbicides. Beans. Intercropping. Brazil.

Information is given on several herbicides which have been tested, or are considered of potential value for use with Phaseolus vulgaris grown in association with other crops, including cassava and sugarcane, particularly as to their effectiveness on weed species and method of application. Recommended herbicides for bean/cassava associated cropping are trifluralin, oryzalin, linuron, and mixtures of linuron with alachlor, oryzalin, trifluralin, metolachlor, and chloramben. (CIAT)

0391

27629 SITOMPUL, S.M.; HARYANTO; SOEMARYO, P.D.; GURITNO, B. 1984. The effect of sweet potato population on the yield of cassava and sweet potato in an intercropping system. Agrivita 7:6-14. En., Sum. En., 9 Ref., Il.

Cassava. Sweet potatoes. Intercropping. Planting. Spacing. Root productivity. Income. Economics. Dry matter. Shoots. Indonesia.

A cassava crop at optimum density (13,333 plants/ha) was intercropped with sweet potato at 3 densities (20,000, 40,000, and 80,000 plants/ha) to ascertain the appropriate sweet potato density in association with cassava in order to achieve max. yield. Both crops were also planted in monoculture at the same densities as they were in the intercrop. Results showed that intercropping cassava with sweet potato had no significant yield advantage over monoculture. The total relative yield of the 2 crops together was approx. 1 (LER = 1), so the yield of the intercrop was the same as would be obtained from the same area in monoculture. Alteration in the plant density of sweet potato did not significantly affect this result. At present price levels, the sweet potato crop planted in monoculture at the high density (optimum) gave a higher return than cassava intercropped with sweet potato or monocropped cassava. (AS)

0392

27628 SITOMPUL, S.M.; NURCAHYANI, SOEMARJO, P.D. 1983. Effect of peanut plant population on the yield of peanut and cassava in an intercropping system. Agrivita 6(2):15-19. En., Sum. En., 7 Ref., Il.

Cassava. Groundnuts. Intercropping. Growth. Root productivity. Income. Economics. Indonesia.

A cassava crop at an optimum density of 13,333 plants/ha was intercropped with peanuts at 3 densities (80,000, 160,000, and 320,000 plants/ha) to study the effect of peanut density on the yields of peanut and cassava. Results showed that intercropping peanuts resulted in a relative yield increase compared with monoculture. There was no difference between monocropped and intercropped cassava. An increase in plant density of peanut was followed by an increase in the relative yield of the intercrop. At the high density (320,000 plants/ha-optimum) there was a 68 percent relative yield increase of the intercrop over monoculture (LER = 1.68). Intercropping cassava with peanut, based on the present price of each, was much more profitable than planting a cassava monocrop. In fact, at the highest density of peanut, the gross income from intercropping almost doubled that from a cassava monocrop. (AS)

0393

27645 STROMGAARD, P. 1984. Field studies of land use under chitemene shifting cultivation, Zambia. Geografisk Tidsskrift 84:78-85. En., Sum.

En., Da., 22 Ref., Il. [Geographical Inst. Univ. of Copenhagen, Haraldsgade 68, 2100 Copenhagen, Denmark]

Cassava. Shifting cultivation. Land use. Maps. Zambia.

Land use aspects of chitimene (shifting) cultivation, in which crops are grown in the ash after burning stacked branches lopped from trees over an area 5-8 times that of the cultivated garden, were studied in northern Zambia over a 250-ha area. Cultivation followed a cycle including woodland fallow, groundnuts, cassava, and maize. New gardens were opened in alternate years. Selected single households were studied for land use and hectarage of all cultivated fields. (AS)

0394

26383 VIEIRA, C. 1984. Cultivo consorciado de mandioca com feijao. (Associated cropping of cassava and beans). Informe Agropecuario 10(118):43-49. Pt., Sum. Pt., 9 Ref., Il. [Univ. Federal de Vicosa, 36.570 Vicosa-MG, Brasil]

Cassava. Intercropping. Root productivity. Planting. Spacing. Brazil.

Investigations carried out in Brazil on cassava interoropping with beans, groundnuts, maize, soybeans, sorghum, and rice are reported. Emphasis was on row spacing (no. of rows and distance between rows) and yields obtained. (CIAT) See also 0287 0299 0329 0335 0340

ABBREVIATIONS AND ACRONYMS

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Af.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
AMV	Alfalfa mosaic virus
approx.	Approximate(ly)
Ar.	Arab
atm.	Atmosphere
ATP	Adenosine 5'-triphosphate
av.	Average
BAP	6-Benzylaminopurine
BBMV	Broad bean mosaic virus
BCMV	Bean common mosaic virus
Bg.	Bulgarian
BGMV	Bean golden mosaic virus
BGYMV	Bean golden yellow mosaic virus
BOD	Biochemical oxigen demand
BPMV	Bean pod mottle virus
BRMV	Bean rugose mosaic virus
BSMV	Bean southern mosaic virus
BV	Biological value
BYMV	Bean yellow mosaic virus
ca.	About (circa)
CAMD	Cassava African mosaic disease
CMV	Cassava African mosaic virus
CBB	Cassava bacterial blight
CBSD	Cassava brown streak disease
CEC	Cation exchange capacity
CER	CO2 exchange rate
CF	Cassava flour
CGR	Crop growth rate
Ch.	Chinese
CLM	Cassava leaf meal
CLV	Cassava latent virus
CM	Cassava meal
cm	Centimeter(s)
COD	Chemical oxigen demand
concn.	Concentration
CP	Crude protein
Cs.	Czech
CSL	Calcium stearyl lactylate
CSW	Cassava starch wastes
C.V.	Coefficient of variation
cv.	Cultivar(s)
2,4-D	2,4-dichlorophenoxyacetic acid
Da.	Danish
De.	German
DM	Dry matter
DNA	Deoxyribonucleic acid
EC	Emulsifiable concentrate
EDTA	Ethylenediaminetetraacetic acid
EEC	European Economic Community
e.g.	For example
ELISA	Enzyme-linked immunosorbent assays
EMS	Ethyl methane sulfonate
En.	English
EP	Preliminary Trials, CIAT
Es.	Spanish
expt.	Experiment(s)
exptl.	Experimental
Fr.	French
ft-ca	Foot candles (10.76 lux)
FYM	Farmyard manure
g	Gram(s)
G	Giga (10⁹)
GA	Gibberellic acid
gal	Gallon(s)
GE	Gross energy
GERs	Glucose entry rates
GLC	Gas-liquid chromatography
Gr.	Greek
h	Hour(s)
ha	Hectare(s)
HCN	Hydrocyanic acid
HDP	Hydroxypropyl distarch phosphate (modified cassava starch)
He.	Hebrew
Hi.	Hindi
HI	Harvest index
hp	Horsepower
Hu.	Hungarian
IAA	Indoleacetic acid
IBA	Indolebutyric acid
IBYAN	International Bean Yield and Adaptation Nursery, CIAT
Il.	Illustrations
in.	Inches
In.	Indonesian
It.	Italian
IU	International unit
J	Joule
Ja.	Japanese
kat	Katal(amount of enzymatic activity that converts 1 mole of substrate/s)
kcal	Kilocalorie(s)
kg	Kilogram(s)
kJ	Kilojoule

km	Kilometer(s)
KNap	Potassium naphthenate
Ko.	Korean
kR	Kiloroentgen(s)
La.	Latin
LAD	Leaf area duration
LAI	Leaf area index
lat.	Latitude
lb	Pound(s)
LD50	Mean lethal dose
LER	Land efficiency ratio
LPC	Leaf protein concentrate
lx	Lux
M	Mega
m	Meter(s)
Mal.	Malay
max.	Maximum
MC	Moisture content
ME	Metabolizable energy
meq	Milliequivalent(s)
met.	Methionine
mg	Milligram(s)
mho	Reciprocal ohm
min.	Minimum
min	Minute(s)
ml	Milliliter(s)
mm	Millimeter(s)
mo.	Month
mol. wt.	Molecular weight
m.p.	Melting point
NAA	Alpha-naphthalene acetic acid
NAD	Nicotinamide adenine dinucleotide
NADH	Nicotinamide adenine dinucleotide, reduced form
NAR	Net assimilation rate
NCE	Net CO2 exchange
NE	Northeast
NER	Net energy ratio
Nl.	Dutch
nm	Nanometer(s) (10-9 m)
no.	Number(s)
No.	Norwegian
NPFs	Negative production factors
NPR	Net protein ratio
NPU	Net protein utilization
NW	Northwest
OM	Organic matter
oz	Ounce(s)
p.	Page
P	Probability
Pa	Pascal(s)
PAN	Peroxyacetic nitrate
PCNB	Pentachloronitrobenzene
PDA	Potato dextrose agar
PER	Protein efficiency ratio
pH	Hydrogen ion concentration
Pl.	Polish
pp.	Pages
pphm	Parts per hundred million
PPI	Preplanting incorporation
ppm	Parts per million
PSA	Potato sucrose agar
Pt.	Portuguese
pv.	Pathovar
Ref.	Reference
resp.	Respective(ly)
Rf	Retardation factor-chromatography
RGR	Relative growth rate
RH	Relative humidity
RNA	Ribonuoleic acid
Ro.	Romanian
rpm	Revolutions per minute
Ru.	Russian
s	Second
SBM	Soybean meal
SCN	Thiocyanate
SCP	Single cell protein
SDS	Sodium dodecyl sulfate
Sk.	Slovak
Sn.	Slovene
sp.	Species
spp.	Species
SSL	Sodium stearyl-2-lactylate
Sum.	Summary
Sv.	Sweddish
t	Ton(s)
TDN	Total digestible nutrients
temp.	Temperature
TIA	Trypsin inhibitor activity
TIBA	2,3,5-Triiodobenzoic acid compound with N-methylmethanamine
TLC	Thin-layer chromatography
TMV	Tobacco mosaic virus
Tr.	Turkish
TSH	Thyroid-stimulating hormone
UDPG	Uridine diphosphate glucose
Uk.	Ukrainian
UMS	Unmodified cassava starch
Ur.	Urdu
UV	Ultraviolet
var.	Variety(ies), varietal
VEF	Bean Team Nursery, CIAT
VFA	Volatile fatty acids
vol.	Volume
VPD	Vapor pressure deficit
vpm	Volume per million
vs.	Versus
W	West, watt
wk.	Week
WP	Wettable powder
wt.	Weight
yr	Year(s)
/	Per

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Information and conclusions reported herein do not necessarily reflect the position of any of the aforementioned entities.

Abstracts on Cassava

(Manihot esculenta Crantz)

Vol. XIII **No. 3** **December, 1987**

CONTENTS

INTRODUCTION

This journal of analytical abstracts, which replaces the former combination of abstract cards and yearly cumulative volumes, is designed to provide a specialized guide to the world's literature on cassava (*Manihot esculenta* Crantz), disseminating research results and ongoing activities related to the crop.

The abstracts report condensed information from journal articles, booklets, mimeographed reports, theses, manuals and other conventional and nonconventional material, categorized into broad disciplinary fields to facilitate rapid scanning. Additionally, abstracts are author and subject indexed to enable more comprehensive consultation.

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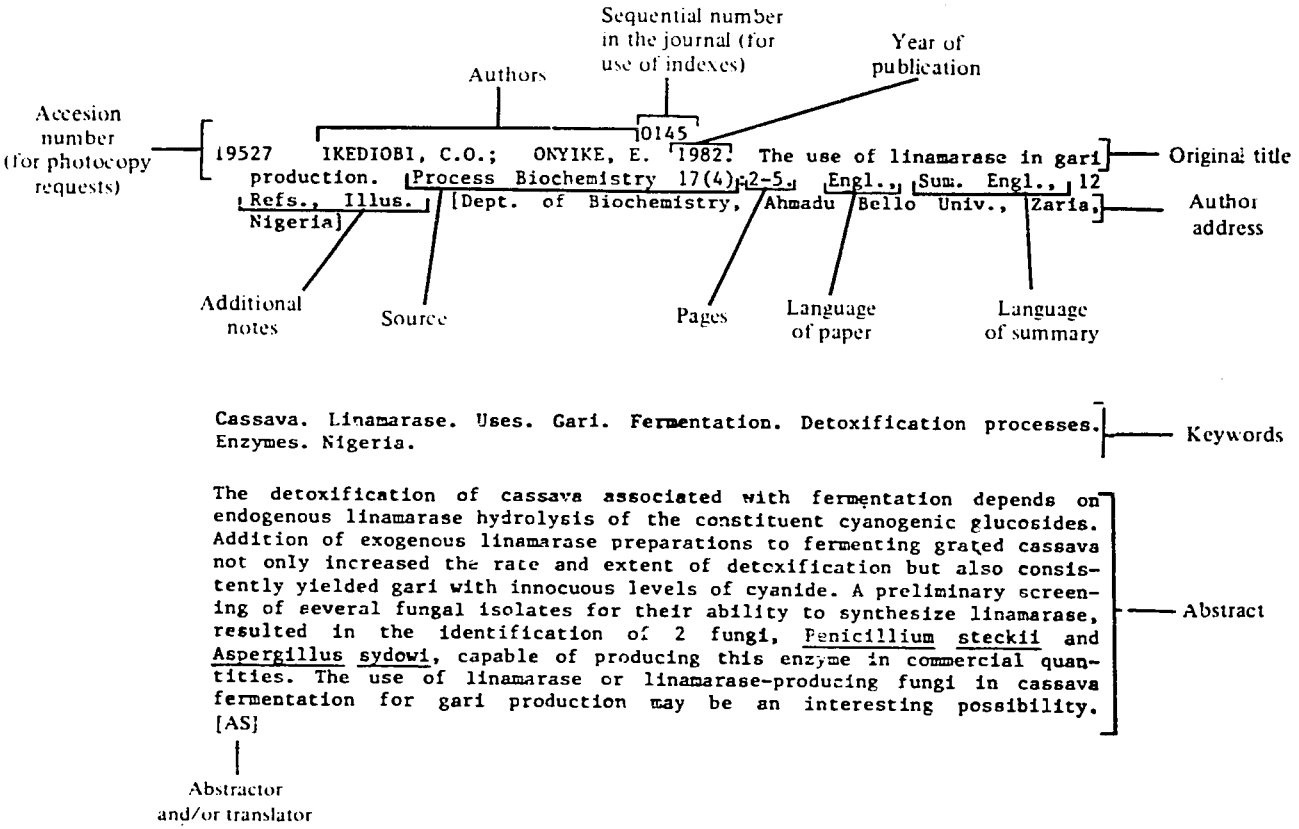

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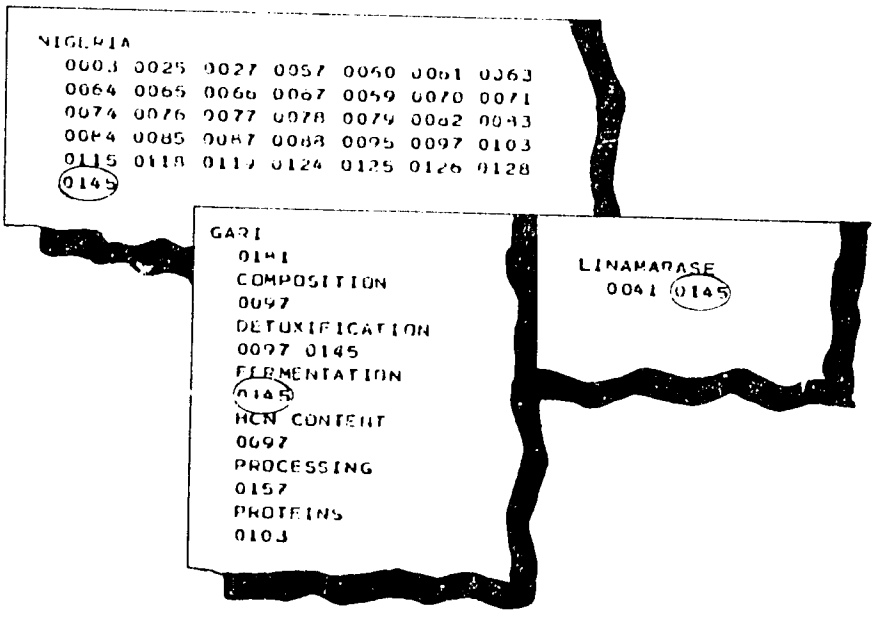

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A00 BOTANY, TAXONOMY AND GEOGRAPHICAL DISTRIBUTION

See 0480 0546

B00 PLANT ANATOMY AND MORPHOLOGY

0395

28584 GUARINO, L.; JACKSON, G.V.H. 1986. Describing and documenting root crops in the South Pacific. Suva, Fiji, Food and Agriculture Organization of the United Nations. RAS/83/001. Field Document no.12. 150p. En., Sum. En., 7 Ref.

Cassava. Root crops. Taro. Sweet potatoes. Yams. Cultivars. Plant anatomy. Cook Islands. Fiji. Papua New Guinea. Niue. Solomon Islands. Tonga. Tuvalu. Vanuatu. Western Samoa.

Collections of cassava, taro, sweet potato, and yam in 9 South Pacific countries (Cook Islands, Fiji, Niue, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Western Samoa) are characterized using modified versions of the descriptors published by the International Board for Plant Genetic Resources. The data have been computerized and the information contained in the database is presented in 2 ways. For some country collections of cassava, taro, and sweet potato, selected descriptors are used to show how accessions may be compared both within the same collection and between those in different countries. Country catalogues containing all the descriptors that have been recorded are also given and for each country, root crop activities are noted, and the results of evaluation programs summarized. (AS)

0396

28306 LOPEZ Z., F.R. 1986. Caracterización agromorfológica y bromatológica de 25 cultivares de yuca (Manihot esculenta Crantz) del norte y nororiente de Guatemala, en el Valle de La Fragua, Zacapa, Guatemala. (Agromorphologic and bromatologic characterization of 25 cassava cultivars of north and northeast Guatemala, in the Valle de La Fragua, Zacapa, Guatemala). Tesis Ing.Agr. Guatemala, Universidad de San Carlos de Guatemala. 67p. Es., Sum. Es., 20 Ref., Il.

Cassava. Cultivars. Agronomic characters. Plant anatomy. Composition. Genetics. Selection. HCN content. Guatemala.

A trial was carried out at El Oasis Zacapa expt. station (Guatemala) to study the agromorphologic and bromatologic characteristics of 25 cassava cv. from the north and northeast of the country. Likewise, the genetic variability, the degree of similarity among cv., and the association between observed characteristics were studied. A 5 x 5 lattice design was used; results were analyzed by variance analysis and grouping techniques (multiple test of means and cluster analysis) were applied. Tests for correlation and confidence interval for the mean were also conducted. Genetic variability was found to exist among cv. both at the inter-cv. and at the intra-cv. level. According to the bromatologic analysis, 96 percent of the cv. have more than the min. starch requirement as a breeding parameter for selection. High values of association were not found among the characters measured. The 5 most promising cv. for breeding programs are 405 and 409 (from El Petén), 449 and 634 (from Izabal), and 478 (from Alta Verapaz). (AS (extract)-CIAT) See also 0571

C00 PLANT PHYSIOLOGY

C01 Plant Development

0397

28539 ARIAS G., D.I. 1987. Efecto de la concentración de sacarosa y manitol sobre el crecimiento in vitro de seis variedades de yuca, Manihot esculenta Crantz. (Effect of saccharose and mannitol concentration on the in vitro growth of six cassava verieties). Tesis Biólcga (Botánica). Cali, Colombia, Universidad del Valle. 158p. Es., Sum. Es., En., 35 Ref., Il.

Cassava. Tissue culture. Saccharose. Mannitol. Cultivars. Propagation. Laboratory experiments. Experiment design. Growth. Nutrient uptake. Colombia.

The effect of various levels and combinations of saccharose and mannitol on the in vitro growth of 6 cassava var. was studied for germplasm conservation purposes. Following techniques developed at CIAT, plants of each var. were micropropagated and randomly assigned to different culture media. Evaluations were conducted every 3 mo. during 9 mo. Although var. differences occurred, the growth of cultures during the 3 evaluation periods (in terms of no. of green leaves, nodes, and apices formed; length of green stems, and fresh and dry wt.) was higher in the control treatments with only 0.1 molar saccharose. Saccharose and mannitol combinations retarded plant growth, being detrimental in some treatments. The best av. growth was obtained after at 3 and 6 mo. incubation, with a decline in growth by mo. 9 in almost all treatments, except in the treatment of 0.03 molar saccharose and 0.07 molar mannitol in which reduced, but continuous growth was observed, maintaining culture viability. (AS)

0398

28310 AYANRU, D.K.G. 1986. Relations between biomass accumulation and infection by vesicular-arbuscular mycorrhizal fungi in cassava as affected by planting date. Phytopathologische Zeitschrift 117(4):362-366. En., Sum. En., De., 14 Ref. [Dept. of Microbiology, Faculty of Science, Univ. of Benin, P.M.B. 1154, Bennin City, Nigeria]

Cassava. Biomass production. Growth. Mycorrhizae. Clones. Timing. Planting. Nigeria.

Roots of 12, 3-mo.-old, field-propagated cassava clones were more heavily mycorrhizal in the dry (Jan.-March and Oct.-Dec.) than in the wet season (April-Sept.): 39-83 and 20-71 percent, resp. Mean dry wt. (biomass) of roots and shoots in the wet season (3.8-7.9 and 9.7-19.1 g/plant) were higher ($P = 0.01$) than in the dry season (2.1-5.9 and 5.4-12.8 g/plant, resp.). Clones with symptoms of CAMD were less mycorrhizal (20-69 percent) than mosaic symptom-free clones (51-83 percent). Higher colonization of roots of the clones by indigenous fungal symbionts and lower biomass accumulation in the dry season are attributed mainly to soil moisture and other effects, while reduced infections in cassava with CAMD symptoms may be due to CAMD-induced reductions in carbohydrate levels. (AS)

0399

28353 OKEKE, J.E. 1980. Nutrient demands of cassava in relation to the potentials of major Nigerian soils. In NAFPP National Cassava Workshop, 4th., Umudike, Nigeria, 1980. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.103-114. En., Sum. En., 10 Ref.

Cassava. Soil fertility. Plant fertility. Soil conservation. Soil impoverishment. Nutrient uptake. Soil physical properties. Fertilizers. Nigeria.

Estimates of nutrients removed in harvested cassava roots are given as well as data on the fertility status of Nigerian soils in cassava growing areas and from cassava leaf analyses to determine nutrient demands of cassava. To replenish N and K losses in a yield of 10 t dry cassava roots/ha, about 240 kg ammonium sulphate and 120 kg muriate of potash/ha are required. Almost always there is a deficiency of N in soils where cassava is widely grown in southern Nigeria. Alfisols have intermediate to high base reserves, but heavy Alfisols tend to hold P against plant uptake. An approach to appropriate fertilizer recommendations requires the calibration of soil analysis data with plant analysis data and the correlation of analysis data with crop responses to fertilization. (CIAT) See also 0405 0416 0421 0431 0434 0435 0445 0459 0465 0472 0479 0501 0529

C03 Chemical Composition, Methodology and Analyses

0400

29021 HIZUKURI, S. 1985. Relationship between the distribution of the chain length of amylopectin and the crystalline structure of starch granules. Carbohydrate Research 141(2):295-306. En., Sum. En., 34 Ref., Il. [Dept. of Agricultural Chemistry, Faculty of Agriculture, Kagoshima Univ., Korimoto 1, Kagoshima-shi 890 Japan]

Cassava. Composition. Industrial starches. Physiology. Japan.

The distributions of chain lengths in the amylopectins of starches from 20 species (11 A-, 6 B-, and 3 C-type) were characterized by high performance liquid chromatography in terms of the relationship between the molecular structure of the amylopectin and the crystalline structure of the starch granule. The wt.-av. chain lengths of the amylopectins of the A-, B-, and C-type starches were in the ranges 23-29, 30-44, and 26-29, resp. Gel-permeation chromatograms of the amylopectins debranched with isoamylase showed bimodal distributions of fractions containing long and short chains for 17 specimens and trimodal distributions of which the fraction containing short chains had twin peaks for wheat, cassava, and tulip amylopectins. The correlation coefficients between the av. chain lengths of amylopectins and the fractions of long and short chains and the ratio of the fractions of short and long chains by wt. were 0.90, 0.69, and -0.95, resp. In general, amylopectin molecules of A-type starches (including cassava) have shorter chains in both the long- and short-chain fractions and larger amounts of the short-chain fractions than those of the B-type starches. The chain lengths of amylopectins of the C-type starches were intermediate and it is inferred that these starches possibly yield any type of crystalline structure depending on environment temp. and other factors, whereas the A- and B-type starches are insensitive to temp. (AS)

0401

29504 PEREIRA, J.F.; SPLITTSTOESSER, W.E. 1987. Exudate from cassava leaves. Agriculture, Ecosystems and Environment 18(3):191-194. En., Sum. En., 11 Ref., Il. [Laboratory of Plant Physiology, Univ. de Oriente, Jusepin, Monagas, Venezuela]

Cassava. Leaves. HCN content. Exudate. Cultivars. Biochemistry. Carbohydrate content. Sugar content. Amino acids. USA.

The composition and possible function of the exudate from the midribs and petioles of leaves of 6 cassava cv. were evaluated. It was found to be composed mostly of fructofuranosides and reducing sugars with few amino acids and no cyanide. Serial sections of the specific sites where the exudate appeared did not reveal the presence of structural nectaries. The fresh exudate was harmless to both common house flies and mosquitoes, which may indicate that the exudate is not a protective factor against insect attack to the cassava plants. It is considered that the exudate is simply secretion from the sieve elements or the companion cells while translocation is taking place at night. (AS)

0402

26888 PEREIRA, J.F.; SPLITTSTOESSER, W.E. 1986. Nitrate reduction by cassava. Plant and Cell Physiology 27(5):925-927. En., Sum. En., 9 Ref., Il. [Laboratorio de Fisiología Vegetal, Univ. de Oriente, Jusepin, Monagas, Venezuela]

Cassava. Nitrate. Plant physiological processes. Genetics. Temperature. Cultivars. USA.

Nitrate reductase was assayed in vivo in cassava cv. 2106 and 2078. Activity in the leaves ranged from 0 to 2.51 micromoles of the NO3(-) reduced/g/h, with no activity in the younger leaves (leaf 1 on top). Nitrate reductase activity was localized in the sides and toward the tip of the lobes of the leaf. The variability of nitrate reductase activity between cv. was attributed to genetic differences; cv. 2106 was almost twice as efficient as 2078. (AS)

0403

29039 SAJISE, C.E. 1985. Post production aflatoxin contamination in cassava (Manihot esculenta Crantz) in the Philippines. M.Sc. Thesis. College, Laguna, Univ. of the Philippines at Los Baños. 81p. En., Sum. En., 74 Ref., Il.

Cassava. Aflatoxin. Postharvest technology. Processing. Harvesting. Storage. Aspergillus flavus. Aspergillus parasiticus. Roots. Cassava chips. Philippines.

The incidence of aflatoxin in cassava roots at different stages of maturity and postproduction steps (harvesting, processing, and storage) was determined. Likewise, the effect of different processing methods on aflatoxin formation was studied. No aflatoxin was obtained at different stages of maturity (cassava roots 7-14 mo. old) and at 24-48 h of sun drying. During storage, however, trace amounts of aflatoxin B1 were observed in stored cubes but not in stored chips and unprocessed roots. When dried adequately (12 percent MC) cassava chips had better keeping qualities than cassava cubes not only because of reduced microbial contamination but also due to the absence of aflatoxin. Cassava cubes dried slowly and showed higher level of microbial contamination during storage. Blanching inhibited the growth of the other fungi but not Aspergillus flavus. In the absence of competing fungi, fresh cassava roots proved to be a good substrate for the growth of A. flavus and A. parasiticus but not for aflatoxin production. A fluorescent compound behaving like aflatoxin B1 was observed in samples exhibiting vascular discoloration. The confirmatory test conducted proved these compounds were not aflatoxin. (AS)

0404

26705 TANJARARUX, R.; YANAGI, S.O.; ARAI, K. 1985. Cassava seed protein of five Thai lines. Agricultural and Biological Chemistry 49(4):1215-1218.

En., 11 Ref., Il. [Division of Agricultural Chemistry, Dept. of Agriculture, Bangkhen, Thailand]

Cassava. Protein content. Cultivars. Seed. Proteins. Analysis. Thailand.

Cassava seed composition and protein characteristics were studied to aid utilization of this potential resource. Seed from 5 Thai cassava lines contained 6.3-6.7 percent moisture, 15.1-19.5 percent CP (Kjeldahl N x 5.71), and 24.5-27.3 percent oil (wt. difference before and after hexane extraction). Protein solubility was studied in ground, hexane-defatted seeds; pH 7.5 phosphate buffer containing 0.4 molar NaCl extracted 41.3-49.6 mg protein (estimated by ratio of absorbance at 260 and 280 nm)/g dry wt., whereas a pH 8.2 buffer containing 2 percent SDS extracted 105.9-116.6 mg/g dry wt. This latter range of (absorbance-estimated) extractable protein corresponded to 55.1-80.3 percent of total CP (N x 5.71). Sedimentation patterns show that cassava seed protein consists mainly of 2-3S components with minor amounts of 7S and 11-13S components. Electrophoretograms of cassava seed protein are illustrated; each cassava line showed similar band patterns. (Food Science and Technology Abstracts) See also 0479 0496 0497 0513 0527 0529 0533

C04 Plant Nutrition

0405

28177 OKEKE, J.E. 1980. Potassium status of some major Nigerian soils in relation to cassava nutrition. Umudike, Nigeria, National Root Crops Research Institute. 15p. En., Sum. En., 18 Ref. Paper presented at the 8th Annual Joint Conference of the National Soil Correlation Committee and the Soil Science Society of Nigeria, Benin City, 1980.

Cassava. K. Soil fertility. Plant nutrition. Mineral deficiencies. Nutrient uptake. Starch content. Plant development. Plant physiology. Soil physical properties. Nigeria.

Levels of K in major cassava soils of southern Nigeria are pesented. Soils from igneous rock materials usually have sufficient reserves of available K and require only maintenance programs that consider crop removal, mineral release, and possible losses due to leaching and runoff. Soils derived from sandstone materials are K-deficient and do not support a good cassava crop without adequate K fertilization. The importance of K in cassava mineral nutrition and crop responses to K are discussed. Good correlations between exchangeable soil K and percent soil clay or leaf blade K content are reported. (AS) See also 0399 0417 0418 0419 0497

D00 CULTIVATION

0406

28173 ODURUKWE, S.O. 1979. Cassava cultural practices. Umudike, Nigeria, National Root Crops Research Institute. 16p. En., 2C Ref. Paper presented at the 3nd. National Cassava Workshop, Umudike, Umuahia, 1979.

Cassava. Cultivation. Fertilizers. N. P. K. Ca. Mg. Propagation. Nutrient uptake. Productivity. Cultivars. Adaptation. Planting. Timing. Weeding. Root development. Weed control. Intercropping. Maize. Cowpea. Nigeria.

A literature review on cultural practices in cassava is presented. Unpublished results of research conducted at the National Root Crops

Research Institute (Umudike, Nigeria) are also included. Cassava cv., propagation, cutting storage, planting position, soil preparation, planting dates, plant population, weed control, cropping systems, fertilization, harvesting, and storage are covered. (CIAT)

0407

29045 VILLAMAYOR JUNIOR, F.G. 1987. Ecological and cultural requirements of cassava. Root Crops Digest 2(1):1-4. En., 6 Ref., Il.

Cassava. Ecology. Ecosystems. Light. Temperature. Water requirements (plant). Soil requirements. Cultivation. Propagation. Planting. Propagation materials. Weeding. Fertilizers. Tetranychus. Saisettia. Cassava bacterial blight. Cercosporidium henningsii. Harvesting. Philippines.

Guidelines are given on the ecological and cultural requirements of cassava for the Philippines. The ecological requirements briefly discussed are light, temp., rainfall, and soil. The cultural aspects discussed are land preparation, var. selection, selection and preparation of planting materials, planting, weed control and cultivation, irrigation, fertilization, pest control, and harvesting. (CIAT)

0408

29007 VILLANUEVA, M.R. 1985. Technology for cassava production in Southeast Asia. Radix 7(1):8-14. En., 8 Ref. [Visayas State College of Agriculture, Baybay, Leyte 7127-A Philippines]

Cassava. Production. Technological package. Technology transfer. Cultivation. Statistical data. Intercropping. Harvesting. Cuttings. Spacing. Timing. Planting. Productivity. Weeding. Cassava bacterial blight. Injurious mites. Philippines.

Data on the area planted and the production of cassava in several countries in 1982 are given. Commercial and subsistence cassava farms are compared and soil characteristics for cassava production are indicated. The diverse effects of the method of land preparation, spacing, age and length of cassava cuttings, planting date, position, and depth, weed control, fertilizer application, cropping system (intercropping or continuous), pruning, and harvest date on plant growth and yield are presented and discussed. (CIAT) See also 0541 0543 0592 0598 0615 0618 0630

D01 Soil, Water, Climate and Fertilization

0409

28376 ANUEBUNWA, F.O. 1981. The demand for fertilizers in Imo State of Nigeria: a case study of cassava farmers. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria. 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.69-84. En., Sum. En., 14 Ref.

Cassava. Cassava programs. Fertilizers. Productivity. Statistical data. Socioeconomic aspects. Nigeria.

The results of a case study conducted in Imo State, Nigeria, to identify factors that influence fertilizer demand, distribution, and usage patterns between 1973-78 are presented. Related agricultural policies during the same period are discussed. Data were obtained from 216 farmers and secondary time-series sources. The estimated increase in fertilizer use during the period was 73.8 percent to which cassava contributed the most with 58.0 percent. The amount of fertilizer used was a direct function of

farmer participation in cooperatives, extension contact, farm size, fertilizer availability at planting time, and distance to fertilizer suppliers. The latter 2 factors were identified as limiting for fertilizer usage. The policy implications of these findings are discussed. Recommendations are based on improving fertilizer distribution networks. (CIAT)

0410

28305 DANTAS, J.L.L.; SOUZA, J. DA S.; FARIAS, A.R.N.; MACEDO, M.M.C. 1986. Cultivo da mandioca. (Cassava cultivation). 3ed. Cruz das Almas-BA, Empresa Brasileira de Pesquisa Agropecuária. Centro Nacional de Pesquisa de Mandioca e Fruticultura. Circular Técnica no.7. 27p. Pt., 27 Ref., Il.

Cassava. Climatic requirements. Soil requirements. Land preparation. Planting. Timing. Spacing. Cultivars. Weeding. Pruning. Pest control. Harvesting. Cultivation systems. Labor. Mechanization. Propagation materials. Brazil.

Technical/agronomic aspects of the cassava crop are presented as guidelines for its cultivation. Recommendations are given on climate and soil requirements, selection of production site, soil preparation, planting time, method, and distances, cv., selection and preparation of planting material, mechanical or chemical weed control, pruning, liming and fertilization, phytosanitary control, and harvest. Multiple cropping systems used in Brazil that include cassava are mentioned; the most important are those with maize and beans. Data are supplied on the machinery, labor, and planting material required to plant 1 ha of cassava. (CIAT)

0411

28303 ENVIRONMENTAL FACTORS affecting cassava production. Radix 7(2):1-3. 1985. En., 3 Ref.

Cassava. Production. Temperature. Light. Solar radiation. Soil water. Nutritional requirements. Diseases and pathogens. Noxious animals. Philippines.

Environmental factors affecting cassava yields are briefly reviewed. Physical factors discussed include temp., light and solar radiation, and soil water and nutrients. Biological factors discussed include diseases and insect pests. (CIAT)

0412

28509 EZUMAH, H.C.; LAWSON, T.L. 1982. Evaluation of some cultural practices for better cassava production. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.83-90. En., 2 Ref.

Cassava. Propagation. Light. Soil moisture. Intercropping. Soil requirements. Groundnut. Maize. Planting. Nigeria.

The results of expt. in which several agronomic factors and cultural practices were studied to improve cassava production are presented. Optimum cassava yields were obtained with 40- to 60-cm-long mature cuttings (6-12 mo. old). While differences in time to maturity between cassava and maize and differences in their growth habit and environmental requirements at times result in a noncompetitive interference in cassava/maize mixtures, differences between maize ideotypes planted at the same plant populations in mixtures with cassava can cause higher or lower root yield reductions depending on how much light is intercepted by the maize canopy; thus, competition can be reduced by adequate selection of maize type and

planting patterns. Cassava can be introduced into groundnut or other crops of similar canopy established during the minor cropping season, without significant yield reductions. (CIAT)

0413

27649 GODON, P. 1985. Précédent cultural et érosion sous culture de manioc. (Previous crop and erosion under cassava cultivation). Agronomie Tropicale 40(3):217-222. Fr., Sum. Fr., En., Es., 21 Ref. [Inst. de Recherches Agronomiques, BP 33, Maroua, Cameroons]

Cassava. Cultivation. Erosion. Spacing. Timing. French Guiana.

Due to its slow growth rate, cassava is considered as an erosive plant. Studies carried out in French Guiana indicate that earth loss can be reduced by 75 percent if the cycle is timed so that max. vegetative growth occurs during the heavy rains and the plant is situated advantageously within the rotation schedule. This method can be as effective as ridging which, up to now, had been presented as the only solution to this problem under intensive cultivation conditions. (AS)

0414

28538 HENDERSON, C.S.; WITTHAWATCHUTIKUL, P.; POONPORN, L. 1985. Obstacles to soil conservation at Rayong, Thailand. Bangkok, Thailand, ASPAC Food and Fertilizer Technology Center. Extension Bulletin no.219. 9p. En., 13 Ref., Il. [Watershed Management Division, Royal Thai Forest Dept., Bangkok, Thailand]

Cassava. Soil conservation practices. Developmental research. Erosion. Mulching. Thailand.

Agricultural practices of the small-scale cassava farmers in the Klong Yai watershed (Rayong, Thailand) and potential solutions for their soil erosion problems are examined. Cropping patterns and previous extension activities and results regarding soil conservation practices are discussed. The strategies discussed for soil conservation include the use of mulches and min. tillage and waterway and gully control. Research needs, policy formulation, and communication strategies are also discussed. (CIAT)

0415

28125 MOHANKUMAR, B.; NAIR, P.G. 1985. Lime sulphur and zinc in cassava production. Kerala, India, Central Tuber Crops Research Institute. Technical Bulletin Series no.2. 15p. En., 7 Ref., Il.

Cassava. Agricultural lime. S. Zn. pH. Root productivity. Starch content. HCN content. Nutrient uptake. P. Ca. Methionine. Fertilizers. India.

The results of studies carried out on the application of lime, S, and Zn to improve cassava productivity in acid laterite soils (pH 4.5-5.0) of India are summarized. The application of CaO at 2000 kg/ha increased root yield by 38.6 percent and improved root quality by increasing the starch content and increasing the level of HCN. Although liming increased the available P in the soil, it did not have a significant effect on P availability to the plant; however, liming improved P and Ca uptake and utilization. No residual effect of lime on the productivity of the succeeding cassava crop was observed. The application of S fertilizers at 50 kg/ha increased cassava yields by 18 percent (3.49 t/ha) over the check, increased the starch content by 5.3 percent, tended to reduce the levels of HCN, and enhanced the met. content (0.088 mg/g for the check vs. 0.132 mg/g with 75 kg S/ha) of the roots. S availability and uptake also increased due to the application of S-containing fertilizers. Zn applied at 2.5 kg/ha increased yield by 12.8 percent (3.0 t/ha) compared with the check; it also increased

root starch content slightly and reduced HCN content. Therefore in acid laterite soils it is recommended to apply 2000 kg lime, 50 kg S, and 2.5 kg Zn/ha to cassava crops. (CIAT)

0416

28347 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Some innovations for cassava production in a heavily populated area of eastern Nigeria. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.35-42. En., 5 Ref., Il.

Cassava. Climatic requirements. Nutritional requirements. Statistical data. Sociocconomic aspects. Technology transfer. Cultivation systems. Nigeria.

A survey was conducted in 6 villages of a heavily populated area of eastern Nigeria in order to recommend innovations for cassava production. Scarcities and hazards for cassava farmers included labor, cash, rainfall, pests, staple food supplies, and protein food supplies. Information on the methods used by farmers to deal with these constraints is provided. Cassava production systems are also described. Innovations can be made by (1) lowering the early labor peak required for clearing, tillage, and planting; (2) intercropping with trees; (3) min. tillage; (4) delayed planting; and (5) use of early or late maturing var. for late plantings. These recommendations are briefly assessed. (CIAT)

0417

28378 NJOKU, B.O. 1981. Some factors affecting the efficiency of fertilizer utilization by cassava. In NAFPP National Cassava Workshop 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.96-104. En., Sum. En., 2 Ref.

Cassava. Fertilizers. Nutrient uptake. Root development. Plant development. Soil amendments. N. P. K. Ca. Mg. Nigeria.

Some factors affecting the efficiency of cassava fertilizer utilization are discussed. Nutrient absorption by cassava is explained, based on soil CEC and responses to N, P, and K fertilizer applications. The efficiency of utilization could be improved through: (1) the use of balanced fertilizers; (2) applications during periods of high demands by the crop and proper incorporation when the soil is wet; (3) careful choice of fertilizer sources to suit soil type; and (4) minimizing losses caused by leaching. (CIAT)

0418

28171 ODURUKWE, S.O. 1977. Cassava agronomic trials at the National Root Crops Research Institute, Umudike 1973-1975. Umudike, Nigeria, National Root Crops Research Institute. 8p. En., 3 Ref. Paper presented at the First N.A.F.P.P. National Cassava Workshop, Umudike, 1977.

Cassava. Soil fertility. Plant fertility. Fertilizers. Experiment design. Productivity. N. P. K. Ca. Mg. Spacing. Nigeria.

The results of fertilizer and plant density expt. with cassava conducted in Nigeria between 1973-75, are presented and discussed. A 1st expt. assessed the application of 0, 22, and 44 kg N/ha, 0, 17, and 34 kg P/ha, and 0, 49, and 90 kg K/ha as ammonium sulphate, simple superphosphate, and muriate of potash, resp. The av. yield was 23.5 t/ha but only N effects were significant ($P = 0.05$). In a 2nd expt. N, P, K, CaO, and MgO were applied alone or in combination at 44, 34, 90, 36, and 216 kg/ha, resp., over 2 seasons; nutrient effects for both seasons were similar and individual nutrients improved fresh root yield significantly. Mg was considered important to NPK fertilization in highly leached acid soils. A 3rd expt.

compared 4 plant spacings (60, 90, 120, and 150 cm on 90-cm ridges, corresponding to 18.5, 12.3, 9.2, and 7.4 thousand plants/ha, resp.) fertilized with 15-10-30, 30-20-60, or 45-30-90 kg NPK/ha. No significant effects on yields were observed for plant spacings or fertilization. The expt. was repeated with the same fertilizer rates but with plant spacings of 45, 60, 90, and 180 cm on 120-cm ridges. Spacing and fertilizer effects on root yield, no., and size were significant; as root yield increased linearly, root size decreased. Root yield started to decrease at 30-20-60 kg NPK/ha. Although results varied, it is recommended to plant 10,000 plants/ha (1 x 1 m) and apply 30-15-90 kg NPK/ha; muriate of potash reduces yields, thus it should be used only when K sulphate is not available. (CIAT)

0419

28519 OKEKE, J.E. 1982. Effect of fertilizers on tuber yields and nutrient removal in tubers of cassava varieties (Manihot esculenta Crantz) on Alfisol and Ultisol of southern Nigeria. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.160-178. En., Sum. En., 15 Ref.

Cassava. Cultivation. Fertilizers. Soil fertility. Productivity. Cultivars. Starch productivity. Nutrient uptake. N. P. K. Ca. Fallowing. Nigeria.

Two field trials were conducted in 1976-78 to evaluate the nutrient input/output balances of Alfisols and Ultisols on which cassava is widely grown in Nigeria. A 3(3) factorial expt. on an Ultisol showed that 30 kg N, 7 kg P, and 150 kg K/ha gave the highest root yield (18.4 t/ha). In another expt. with 3 cassava var. (60506, Nwugo, and 53101) and N and P at 2 levels on an Alfisol, the effect of P on root DM yields at 12 mo. was significant. Cassava var. 60506 gave significantly higher yields than Nwugo and 53101. Estimates of nutrient removal showed that, except for K, approx. equal amounts of the major nutrients were removed from the Alfisol and Ultisol per unit wt. of roots; K removal was higher in Alfisols (11.2 kg/ha) than Ultisols (8.5 kg/ha). Cassava var. 60506 removed 7.0-8.0 kg N, 0.4-0.5 kg P, and 0.4 kg Ca/ha. The need to maintain soil nutrient status through fertilization and/or legume and grass fallow is stressed. (CIAT)

0420

27666 VILLAMAYOR JUNIOR, F.G.; LABAYAN, A.L. 1984. Response of cassava to missing hills. Radix 6(1):4-5. En., [Philippine Root Crop Research & Training Center, Visayas State College of Agriculture, Baybay, Leyte 7127-A, Philippines]

Cassava. Spacing. Germination. Productivity. Field experiments. Cuttings. Soil moisture. Philippines.

The results of various expt. on the yield response of cassava to missing hills (plant loss), due to cutting or seedling losses, are briefly discussed. In an expt. using cassava var. Golden Yellow and CMC-40 at 13,333 plants/ha, missing hills of up to 30 percent did not affect yields significantly; the critical level of missing hills which can cause significant yield reductions is still subject to further study. Another expt. to test the effect of fertilization and missing hills also showed that 30 percent missing hills had no significant effect on yields; 10 percent missing hills occurring between planting and 3.5 months after planting did not reduce yields significantly, but 30 percent missing hills occurring during the 3rd mo. after planting or thereafter significantly reduced yields. The best way to combat missing hills is to plant only cuttings of good quality, i.e., mature, healthy, and fresh cuttings in a well-prepared and sufficiently moist soil. (CIAT)

0421

28354 VINE, P.N. 1980. Soil management for cassava. In NAFPP National Cassava Workshop, 4th., Umudike, Nigeria, 1980. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.115-119. En., 3 Ref.

Cassava. Land preparation. Soil physical properties. Cultivation. Plant physiology. Plant development. Nigeria.

Cassava was planted in uniform field trials on 3 soil types (coconut bast, silica sand, bottle glass sand) in plots with and without tillage to measure the response to soil conditions or tillage. Results indicated that cassava responds to soil conditions rather than to the method by which the conditions were obtained (tillage method); root no. and size increased with more favorable soil conditions. The only difficulty foreseen for cassava grown under a mulched no-tillage system, providing good root growth conditions exist, is in pulling the roots from the ground at harvest. (CIAT)

0422

28309 VISWAMBHARAN, K.; SASIDHAR, V.K. 1985. Low cost soil conservation technology for the hill slopes of Kerala. Taiwan, Republic of China, Asian and Pacific Region. Food and Fertilizer Technology Center. Extension Bulletin no.220. 17p. En., Sum. En., Ch., Ja., 16 Ref. [Regional Agricultural Research Station, Pattambi, Kerala, India]

Cassava. Soil conservation practices. Technology package. Intercropping. Groundnut. Erosion. Soil water. Fallowing. Rainfall data. India.

The effect of various agronomic soil conservation measures on soil loss, surface runoff, and subsoil moisture storage on hill slopes was studied at the Instructional Farm in Vellanikkara (Kerala, India) between Sept. 1979-May 1980. The treatments included cassava grown alone in mounds, cassava in mounds with groundnut as an intercrop, cassava grown alone in ridges across the slope, cassava in ridges across the slope with groundnut as an intercrop, and uncultivated bare fallow as a control. Runoff plots 24.3 m long by 2.7 m wide were used. The runoff and soil losses were determined under the 18 erosive rainfalls that occurred during the period under study. Periodical observations of subsoil moisture were taken with a neutron scattering probe. The data were subjected to statistical analysis. Results showed that runoff and soil loss were significantly higher in the bare fallow plot, and that the groundnut intercrop significantly reduced runoff and soil loss, both before and after harvest. (AS) See also 0399 0405 0426 0427 0432 0468 0485 0497 0540 0544 0550 0557 0562 0574 0577 0580 0581 0583 0584 0588 0591 0593 0594 0600 0602 0603 0610 0622 0625 0626

D02 Cultivation Practices: Propagation, Planting, Weed Control and Harvesting

0423

28114 ASHOKAN, P.K.; NAIR, R.V.; KURIAN, T.M. 1984. Influence of stages of harvest on the yield and quality of cassava (Manihot esculenta Crantz). Madras Agricultural Journal 71(7):447-450. En., Sum. En., 5 Ref. [Dept. of Agronomy, College of Horticulture, Vellanikkara 680 654, Trichur, Kerala, India]

Cassava. Harvesting. Timing. Field experiments. Cultivars. Root productivity. Fiber content. Starch content. HCN content. Dry matter. Human nutrition. India.

In field expt. in Nileswar and Vellanikkara, India, cassava var. M.4 and H.2304 were harvested at 6-12 mo. after planting. Fresh tuber yield did not differ significantly among the harvests at 6-9 mo. after planting. Although harvesting between 10-12 mo. increased yield, it also increased root fiber content and reduced cooking quality. Starch, fiber, and HCN contents were higher and DM content lower in cv. H.2304 than in cv. M.4. Although HCN content increased up to 8 mo. after planting, it was still within the safety limits. (AS)

0424

28344 AZIH, V.A. 1980. Review of activities 1979/80. In NAFPP National Cassava Workshop, 4th., Umudike, Nigeria, 1980. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.10-26. En.

Cassava. Cultivars. Weeding. Productivity. Fertilizers. Cassava programs. Nigeria.

Cassava projects conducted during 1979-80 in Nigeria by the National Cassava Centre are briefly reported. Results are given for the following projects: var. pre-minikit trial, herbicide pre-minikit trial, mixed cropping pre-minikit trial, var. minikit trial, fertilizer minikit trials, cassava/maize demonstrations, and cassava multiplication. Preliminary data obtained are reported in table form. (CIAT)

0425

28569 CHEZE, B. 1983. Le point sur la mécanisation de la récolte du manioc. (Considerations on the mechanization of cassava harvesting). Machinisme Agricole Tropical no.83:15-17. Fr., Il.

Cassava. Harvesting. Mechanization. Agricultural equipment. Technology evaluation. France.

Data are presented on area planted to cassava worldwide, cassava yields, and total production, and some overall considerations are included on harvest mechanization during the stages of eliminating aerial parts and uprooting. Characteristics of the various implements developed for such operations are described and results obtained are presented. The most oustanding results of a comparative trial carried out by CIAT with 2 implements to harvest cassava are given and confronted with those obtained in other countries of the world. Finally, a specialist is interviewed regarding the efficiency of cassava harvesting aids, the utilization of cassava leaves, the consequences of lesions to tubers, and the possibility of using rooters to harvest yams. (CIAT)

0426

29038 CRAMB, R.A. 1985. The importance of secondary crops in Iban hill rice farming. Sarawak Museum Journal 34(55):37-45. En., Sum. En., 3 Ref., Il.

Cassava. Secondary crops. Intercropping. Maize. Taro. Yams. Timing. Spacing. Planting. Productivity. Feeds and feeding. Swine. Indonesia.

The role of intercropping in Iban hill rice farming systems of Sarawak is discussed. Reference is made to the agronomy of intercrops, labor requirements, and economic contribution to hill farming enterprise. The most important secondary crops are maize and cassava. About 2/3 of the households plant cassava and it is slowly replacing indigenous crops such

as taro, yams, and sweet potatoes due to its greater versatility in terms of planting sites. Planting takes place in Sept. or Oct. and cuttings are spaced at 2-4 m. Leaves are picked throughout the year and are eaten as vegetables. Harvesting begins in March or April and continues for as long as 2 or 3 yr, producing over 800 kg dry wt./farm. The tubers are grated for livestock feed, particularly for pigs. (CIAT)

0427

28111 INSTITUT DE RECHERCHES AGRONOMIQUES TROPICALES ET DES CULTURES VIVRIERES. 1983. Les tubercules et racines: manioc. (Tubers and roots: cassava). In _____. Rapport Annuel 1983. Paris, France. pp.137-150. Fr.

Cassava. Cultivation systems. Planting. Timing. Fertilizers. Weeding. Cultivars. Clones. Adaptation. Productivity. Soil physical properties. Harvesting. Xanthomonas manihotis. Ivory Coast. French Guiana. French Polynesia. New Caledonia.

The results of research on cassava, conducted by the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres during 1983, in Ivory Coast, French Guiana, French Polynesia, and New Caledonia, are discussed. In Ivory Coast, work was done on cultivation techniques (planting methods, fertilization, weed control, and planting dates), crop protection, and quality of production. The var. B 33 and Tebuca were the best; the position of the cuttings did not affect production, while planting in ridges increased it significantly. The placing of cuttings at a depth of 5 cm gave the best results and there was a response to fertilization with NPK. In French Guiana, applied botanic aspects of the crop were dealt with. The clones that adapted best to the different conditions were M 10, M 15, M 22, M 23, and M 33 and the last 3 increased their production with fertilizers; oxyfluorfen and dalapon in doses of 1.26 and 3.91 kg/ha were effective in the control of weeds. In French Polynesia, the expt. focussed on intensive production and in New Caledonia, cassava materials were evaluated. In French Polynesia, Colombian var. selected at CIAT showed the best behavior, and in New Caledonia, of the 48 materials evaluated, 9 yielded more than 40 t/ha and 4 exceeded 60 t/ha. (CIAT)

0428

28379 JOSHUA, A.; UTOH, N.O.; ADEGBUYI, E. 1981. Progress and problems of national cassava multiplication. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria. 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.105-109. En.

Cassava. Technology transfer. Cassava programs. Seed. Nigeria.

The progress and problems of the Nigerian cassava multiplication infrastructure are summarized. The policies, the national program, the seed strategy, and the need for continuity in cassava multiplication activities are discussed. (CIAT)

0429

28568 NOEL, A.; MONNIER, J. 1983. Etude de solutions mécanisées pour la récolte du manioc: essais conduits par le Cima sur le centre d'appui Sodepalm de Toumodi. (Study on mechanized solutions for cassava harvesting: trials carried out by CIMA at the Sodepalm support center of Toumodi). Machinisme Agricole Tropical no.83:8-15. Fr., Il.

Cassava. Mechanization. Harvesting. Agricultural equipment. Ivory Coast.

Some concepts related to the physiology of the cassava plant are briefly explained and a list is made of the operations carried out during the harvesting of this tuber crop (treatment of aerial parts, uprooting,

detopping, and loading), of which the last 2 are done manually in Ivory Coast. The overall characteristics of the 1st 2 operations as well as the operation of the machinery developed for such purposes are briefly described; results achieved are also given. The 4 operations currently involved in cassava harvesting (crushing of stems, uprooting of tubers, detopping of tubers, and loading) are briefly described; the 1st 2 are being mechanized. A technical description is included of 2 types of stem crushers and 1 type of uprooter and their operation is explained. The methodology and results obtained in trials conducted in Sodepalm (Toumodi) are presented, listing the adjustments done, the defects found, and the modifications performed to the mentioned machinery. Finally, some recommendations are given that should be taken into account by the constructor to improve the efficiency of these machines. (CIAT)

0430

28350 NWOKEDI, P.M. 1980. Mechanization of cassava production. In NAFPP National Cassava Workshop, 4th., Umudike, Nigeria, 1980. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.60-66. En., Sum. En., 4 Ref.

Cassava. Peeling. Planting. Rasping. Agricultural equipment. Harvesting. Mechanization. Nigeria.

Studies designed at the National Root Crops Research Institute (Umudike, Nigeria) to develop techniques and machines suitable for planting, harvesting, and processing cassava roots are briefly discussed. Operational parameters and a description of a cassava planter, harvester, and processing machine (chipper) are given. (CIAT)

0431

28352 ODURUKWE, S.O. 1980. Cassava cultural practices. In NAFPP National Cassava Workshop, 4th., Umudike, Nigeria, 1980. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.88-102. En., 18 Ref.

Cassava. Propagation. Planting. Cultivars. Productivity. Weeding. Plant development. Root development. Harvesting. Storage. Nigeria.

Available literature and unpublished work of the National Root Crops Research Institute (Nigeria) on agronomic and cultural practices for cassava production are reviewed. Land preparation, planting material (sources, storage, preparation, and planting position), planting time, plant population, cropping systems (monocrops and intercrops), weed control, harvesting, and storage are discussed. It is recommended that cassava be planted on ridges in heavy soils with more than 1200 mm rainfall/yr, at the beginning of the rainy season in areas with no severe disease problems and at the end of the rains in those with serious problems. Healthy 20-cm stem cuttings should be used, previously dipped in fungicides. Vertical planting at 10 cm depth and a plant population of 10,000 plants/ha are recommended. Weed control (chemical or manual) should be performed during the 1st 4 mo. (CIAT)

0432

28178 OHIRI, A.C. 1983. Evaluation of tillage systems on cassava grown under mulch and effect on soil organic C. Umudike, Nigeria, National Root Crops Research Institute. 11p. En., Sum. En., 11 Ref., Il. Paper presented at the First National Tillage Symposium, Ilorin, Nigeria, 1983. [National Root Crops Research Inst., Umudike, Umuahia, Nigeria]

Cassava. Cultivation. Mulching. Soil fertility. Soil physical properties. Productivity. Soil conservation practices. Plowing. Mechanization. Technology transfer. Fertilizers. N. P. K. Nigeria.

The effects of 3 tillage systems, mulching, and fertilization on cassava production and soil organic C were investigated for 2 yr on a sandy clay loam soil at the National Root Crops Research Institute Farm (Umudike, Nigeria). Tillage treatments were (1) plowing, harrowing, and ridging (conventional), (2) digger-made narrow holes (min.), and (3) pushing cassava cuttings directly into the soil (zero tillage). Mulching treatments were no-mulch and grass mulch, and fertilization consisted of no fertilizer or an NPK fertilizer mixture. There were no significant differences in fresh root yield due to treatments and their interactions in the 1st and 2nd yr. Significant differences were obtained for the tops due to tillage treatments in the 2nd yr and highly significant differences due to fertilizer application in the 1st and 2nd yr. Both zero and min. tillage outyielded conventional practice by 40 and 23 percent, resp. Fertilizer application increased top yields by 34 percent in the 1st yr and 57 percent in the 2nd yr. A sandy clay loam soil without aeration problems may not require intensive tillage practices for cassava production. Mulch builds up soil OM essential for aggregation, and fertilizer is essential to maintain soil nutrient potential. Appropriate agricultural implements should be designed to facilitate the mechanization of reduced tillage operations. (AS)

0433

28374 OKEKE, J.E. 1981. Studies on adaptation of the technique of rapid multiplication of cassava for adoption by farmers. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute, National Cassava Centre. pp.56-60. En., Sum. En., 2 Ref.

Cassava. Propagation. Plant development. Nutritional requirements. Technology transfer. Cultivars. Cuttings. Nigeria.

The results of 3 expt. on the variables of the cassava rapid multiplication technique for adoption by Nigerian farmers are briefly discussed. In expt. 1 and 2, unsterilized soil was as good as other media for rooting 2-node cuttings and superior for top growth yield of propagules 47 days after planting. In expt. 3, the optimum no. of nodes/1-m-long cutting of 3 var. (60506, TMS 30211, and TMS 30395) was determined. Var. differences were observed in no. of propagules generated from the same no. of nodes/cutting of the same age, the highest no. of propagules being found for var. 60506; 6 nodes/ cutting appeared optimum for TMS 30211 and 30395. For a rapid multiplication of disease-free elite materials, a farmer would require a nursery bed of well-drained soil near a water source, shade, and polyethylene bags. (CIAT)

0434

28157 OKOLI, P.S.O.; WILSON, G.F. 1986. Response of cassava (Manihot esculenta Crantz) to shade under field conditions. Field Crops Research 14(4):349-359. En., Sum. En., 16 Ref., Il. [Federal Agricultural Coordinating Unit, 6/8 Unije Street, Independence Layout, P.O. Box 1766, Enugu, Anambra State, Nigeria]

Cassava. Plant development. Productivity. Illumination. Leaf area. Nigeria.

To determine the effect of shading on its development and yield, cassava was subjected to 6 shade regimes (0, 20, 40, 50, 60, and 70 percent of full sunlight). The 2-yr field study was undertaken on a sandy clay loam soil

(Oxic Paleustalf or Ferric Luvisol) in SW Nigeria. As the percentage of shade increased plant height increased and LAI decreased. Stem and leaf dry wt. increased with decreasing degree of shade. All levels of shade delayed tuber bulking. Compared with the 0 percent shade or control, the 20, 40, 50, 60, and 70 percent shade levels reduced cassava yield by 43, 56, 59, 69, and 80 percent, resp. Suggestions for improving cassava productivity in mixed cropping and intercropping systems include the use of late-maturing cassava var., reducing the population of the associated crop, and allowing long recovery intervals after the harvest of the intercrop. (AS)

0435

27659 PARDALES JUNIOR, J.L. 1985. Influence of preplanting tillage system on the dry matter and nitrogen accumulations of cassava. Philippine Journal of Crop Science 10(3):147-152. En., Sum. En., 13 Ref., Il. [Philippine Root Crop Research & Training Center, Visayas State College of Agriculture, Baybay, Leyte 7127-A, Philippines]

Cassava. Land preparation. Growth. Dry matter. Cultivation. Nutrient uptake. Leaves. Stems. Roots. N. Philippines.

Root growth and development and DM and N accumulations of cassava var. Golden Yellow were investigated under zero, min., and conventional tillage systems at the Philippine Root Crops Research and Training Center in Pangasugan. Root density was suppressed in the zero tillage system but was greatly favored by the conventional method, especially during the early establishment period of the crop. Zero tillage consistently showed depressed DM and N accumulations in the leaves, stems, and tubers of cassava during all growth stages of the crop. Min. and conventional tillage methods favored DM production and N accumulation in these same plant components, but significantly more DM and N were exhibited with the latter than with the former tillage method in almost all stages of crop growth. Percentages of total DM and N in the tubers were generally higher in tilled plants than in nontilled ones. In terms of CGR and N uptake rate, conventional tillage was superior to min. tillage, which in turn was superior to zero tillage. (AS)

0436

27693 SANTIAGO, A.D. 1985. Efeito da poda na produtividade, conservacao e qualidade de raizes de mandioca (Manihot esculenta Crantz). (Effect of pruning on the productivity, preservation, and quality of cassava). Tese Mestrado. Lavras-MG, Brasil, Escola Superior de Agricultura de Lavras. 112p. Pt., Sum. Pt., En., 54 Ref., Il.

Cassava. Pruning. Timing. Harvesting. Cassava roots (vegetable). Root productivity. Cultivars. Deterioration. Composition. Plant injuries. Resistance. Brazil.

The effect of pruning and time of harvest on the productivity, preservation, and quality of roots of 5 cassava cv. (Lagoa Brava, Branca de Santa Catarina, Gostosa, Pao do Chile, and IAC 14-18) was studied at Escola Superior de Agricultura de Lavras (Minas Gerais, Brazil), during Nov. 1983-April 1985. A randomized block exptl. design with 4 replicates was used. Parameters assessed were final stand, stem, root, and starch production, physiological deterioration, MC, and starch, total sugars, total phenolic compounds, fermentable hexoses, and fiber contents in the roots. Pruning 25 days before harvesting did not affect root productivity. Nevertheless, pruning increased the resistance of the roots to physiological decay and increased the total sugars contents in the roots of all the cv. studied. On the other hand, pruning reduced the starch content and increased the percentage of total phenolic compounds in the roots (DM)

of all the cv., except cv. Pao do Chile and Gostosa, resp. Harvesting both pruned and intact plants 25 days later resulted in greater resistance to physiological decay of harvested roots of cv. Branca de Santa Catarina and Pao do Chile; root fiber content also increased for all cv. (AS)

0437

28122 VEGA V., J.G.; ROMANOFF, S.; IBARRA, J. 1986. Situación del cultivo de la yuca en las provincias orientales de Napo y Pastaza; informe. (Report on cassava cultivation in the eastern provinces of Napo and Pastaza). Quito, Instituto Nacional de Investigaciones Agropecuarias. 41p. Es., Il.

Cassava. Cultivation. Socioeconomic aspects. Cultivars. Feeds and feeding. Swine. Storage. Postharvest losses. Postharvest technology. Marketing. Technology transfer. Statistical data. Production. Economics. Ecuador.

Cassava cultivation in the eastern provinces of Napo and Pastaza, Ecuador, is briefly discussed on the basis of observation visits and interviews carried out during March, 1986. The traditional production system used in the area is also described and some of the var. cultivated are mentioned: white, purple, and cream (farmers) and Pucalumo, Yanalumo, Yuralumo, Acchalumo, Otunlumo, and Guagua-lumo (Payamino exptl. station). Abandoned installations for cassava starch production do exist; these could be restored and put into use. An interview to 8 wholesalers and 28 retailers, to determine the demand for cassava and the need of technology to reduce product perishability, indicated that (1) currently there is no need for increased cassava production; (2) a risky micropurchasing complex already exists, a situation that must change in order to increase the demand for cassava; (3) the major problem for wholesalers and retailers is postharvest root deterioration; (4) retailers reject the idea of storing cassava in plastic bags and are unexperienced in the use of preserving agents; (5) the quality of local var. must compete with that of "purple" cassava from Santo Domingo for human consumption. Recommendations include the detailed study of the use of cassava in swine production, study of quality factors of the crop, and promotion of the use of thiabendazole for root conservation. More information is needed on starch processing and the corresponding demand for cassava, production zones, and yields. (CIAT) See also 0398 0399 0410 0413 0418 0420 0421 0445 0458 0474 0485 0490 0491 0495 0496 0499 0540 0542 0544 0546 0555 0561 0562 0566 0583 0585 0588 0589 0590 0594 0609 0621 0625 0629

D03 Energy Productivity and Yields

0438

28367 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Review of cassava varieties; ecological trials (10 top selections). In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.200-204. En.

Cassava. Ecosystems. Cultivars. Productivity. Kpokpo gari. Adaptation. Selection. Nigeria.

Yield data of the 10 top cassava var. from each of 5 Nigerian locations (Umudike, Ugwuoba, Otobi, Ajasse, and Obior), planted in May 1978 and harvested 1 yr later, are presented. Selected var. for advanced trials were 60506, 4080, 30337, U/41044, 40378, 30786, 30040, 73/335, Tmx 335, and 4(2)0599. (CIAT) See also 0405 0409 0418 0426 0427 0432 0434 0437 0465 0467 0479 0501 0542 0544 0547 0557 0562 0571 0573 0578 0579 0581 0584 0587 0589 0591 0601 0602 0603 0610 0614 0620 0625 0627 0629

0439

28304 HIROSE, S. 1986. Physiological studies on postharvest deterioration of cassava roots. Japan Agricultural Research Quarterly 19(4):241-252. En., Sum. En., 37 Ref., Il. [College of Agriculture & Veterinary Medicine, Nihon Univ., Shimouma, Setagaya, Tokyo, 154 Japan]

Cassava. Deterioration. Molds. Storage. Cultivars. Resistance. Pruning. Starch content. Plant physiology. Roots. Postharvest losses. Japan.

A series of expt. were carried out to determine the process of root deterioration and to examine changes in respiration and ethylene production in cassava roots and tissue blocks in relation to physiological deterioration (PD). Two distinct types of deterioration were observed: one was a ring of brownish or blue-brownish coloration in the intervening part between the outermost part and the innermost part of parenchymatous tissue (physiological), and the other was the softened and discolored tissues infected by many kinds of fungi (microbial). Twelve cv., 15 mo. of age, were tested for susceptibility or resistance to PD. It was proved that var. difference in PD was seen more clearly and earlier in tissue blocks than intact roots. The degree of PD was negatively correlated with MC of roots at harvest, and positively correlated with root starch content. Pruning treatment, leaving only 30 cm of the stem, practiced 2-3 wk. before harvest or burying roots underground for 3 wk. was effective in delaying the occurrence of PD. Respiratory rates of root pieces taken from artificially injured roots increased rapidly reaching a peak 1 day after harvest and another max. peak 4 or 5 days later. The 1st peak was regarded as wound respiration and the 2nd one is caused by biochemical changes related to development of PD. Var. difference in respiratory rate was observed. Ethylene was produced in root slices in detectable concn. 15-16 h after incubation, reaching max. value after 1 day of incubation. Var. difference in the amount of ethylene production was observed. The amount of ethylene produced in root tissue blocks taken from pruned plants was slightly different from that taken from unpruned plants. Ethephon applied to root tissue blocks showed no or little effect on respiratory rate of the tissue blocks. Only a slight progress of PD was observed in ethephon-treated root tissue blocks. It appears that this tendency was similar to both root tissue blocks taken from pruned and unpruned plants. Thus, it was difficult to make clear the effect of pruning treatment on ethylene production and respiratory rate of roots, probably due to the use of root tissue blocks as exptl. material. (AS)

0440

27694 MELO, A.S. DE 1985. Efeito do armazenamento de ramas sobre algumas características da mandioca (Manihot esculenta Crantz) em duas localidades de Minas Gerais. (Effect of branch storage on some characteristics of cassava at two sites of Minas Gerais). Tese Mestrado. Lavras-MG, Brasil, Escola Superior de Agricultura de Lavras. 76p. Pt., Sum. Pt., En., 45 Ref., Il.

Cassava. Field experiments. Stems. Storage. Timing. Planting. Root productivity. Brazil.

Two expt. were carried out with cassava under field conditions at the Escola Superior de Agricultura de Lavras (Nov. 1982-July 1984) and at the Felixlandia exptl. farm (Nov. 1981-Oct. 1983) in soils classified as Dark Red Latosol and Red Yellow Latosol, resp. Cv. Iracema was used in Lavras while cv. Sonora was used in Felixlandia. Two chemical treatments (with and without), 2 storage positions (vertical and horizontal), and 4 storage

periods (0, 30, 60, and 90 days) were tested in split-split plots arranged in randomized blocks. Characteristics assessed were initial and final stand, plant height, stem diameter, no. of stems/plant, branch production, no. of tuberized roots/plant, root production, percentage of starch, starch production, and HI. The results showed that under these exptl. conditions the use of chemicals did not contribute to the conservation of branches in either Lavras or Felixlandia regarding any of the characteristics studied. Likewise, the storage position did not influence the conservation of branches in either locality. For cv. Iracema under Lavras conditions, the conservation of branches must not exceed 60 days of storage; however, cv. Sonora under Felixlandia conditions can be stored up to 90 days without affecting branch or root production. (AS)

0441

28302 QUEVEDO, M.A.; DATA, E.S. 1985. Preharvest pruning of cassava in relation to root deterioration. Radix 7(2):13-14. En., 11 Ref. [Philippine Root Crop Research & Training Center, Visayas State College of Agriculture, Baybay, Leyte, Philippines]

Cassava. Pruning. Cassava roots (vegetable). Storage. Deterioration. Postharvest losses. Philippines.

The effect of preharvest pruning on deterioration of cassava roots during storage was studied in field trials in the Philippines in which 7-mo.-old plants were pruned 1, 2, 3, or 4 wk. before harvest. Undamaged roots were stored at 27-31 degrees Celsius with 70-90 percent RH. For unpruned plants and those pruned 1, 2, 3, and 4 wk. before harvest, the mean root wt. loss and the root deterioration were, resp., 6.44 and 30.95, 4.99 and 26.44, 4.86 and 19.61, 5.08 and 20.47, 5.10 and 17.29 percent. Vascular streaking was greater in roots from unpruned plants. (CIAT)

0442

27620 RICKARD, J.E. 1985. Physiological deterioration of cassava roots. Journal of the Science of Food and Agriculture 36(3):167-176. En., Sum. En., 28 Ref., Il. [Tropical Development and Research Inst., 56-62 Gray's Inn Road, London WC1X 8LU, England]

Cassava. Postharvest losses. Cassava roots (vegetable). Deterioration. Storage. Enzymes. Toxicity. Human nutrition. England. Colombia. Jamaica. Costa Rica.

The changes occurring in cassava roots after harvest in response to injury and storage humidity are investigated in detail. Wound responses were observed in cassava roots from Colombia, Jamaica, and Costa Rica; they included: increased activity of phenylalanine ammonia lyase, an enzyme associated with phenol biosynthesis; increased activity of peroxidase and polyphenol oxidase; formation of phenols/polyphenols including leucoanthocyanidins, catechins, scopoletin, and condensed tannins; and often the formation of a wound periderm. The responses did not remain localized at wound surfaces in roots when held at low storage humidity but spread through the roots causing a discoloration of the vascular tissue and storage parenchyma. Roots stored at high humidity showed a more typical wound response with localized production of phenols and periderm formation. On the other hand, the conclusion that condensed tannins are formed during physiological deterioration requires further investigation. The anti-nutritional effects of condensed tannins could be significant in developing countries where cassava is a staple food crop. (AS) See also 0403 0437 0454 0536 0609

0443

28307 LEUSCHNER, K.; TERRY, E.; AKINLOSOTU, T. 1980. Field guide for identification and control of cassava pests and diseases in Nigeria. Ibadan, Nigeria, International Institute of Tropical Agriculture. Manual Series no.3. 19p. En., Il.

Cassava. Oligonychus gossypii. Mononychellus tanajoa. Phenacoccus manihoti. Zonocerus variegatus. Cassava African mosaic virus. Cassava bacterial blight. Colletotrichum manihotis. Fomes lignosus. Phytophthora. Pest control. Disease control. Symptomatology. Insect biology. Nigeria.

The symptoms, life cycle, spread, control, and history of the major insect pests of cassava in Nigeria (Oligonychus gossypii, Mononychellus tanajoa, Phenacoccus manihoti, and Zonocerus variegatus) are briefly described and illustrated. Information is also given on the symptoms, causal agent, dissemination, and control of major diseases: CAMD, CBB, anthracnose (Colletotrichum manihotis) and root rots caused by Phytophthora and Fomes lignosus. (CIAT) See also 0463

E02 Bacterioses

0444

28170 ARENE, O.B. 1978. Cassava bacterial blight in Nigeria. Umudike, Nigeria, National Root Crops Research Institute. 15p. En., Sum. En., 23 Ref. Paper presented at the 8th Annual Conference of Nigerian Society for Plant Protection, Benin City, 1978.

Cassava. Xanthomonas campestris pv. manihotis. Maize. Intercropping. Disease control. Symptomatology. Nigeria.

Different aspects (symptomatology) of CBB are reviewed and progress made towards its control in Nigeria is summarized. Effective control measures are pruning of infected plant parts, late or early planting, balanced fertilization, intercropping with maize and/or melon, selection of resistant cassava cv., and burial of inoculum sources to reduce the pathogen's longevity. (CIAT)

0445

28166 ARENE, O.B. 1977. Distribution and survival of Xanthomonas manihotis in cassava stem tissues and its significance in the selection of bacteria-free planting material. Nigerian Journal of Plant Protection 3:16-23. En., Sum. En., 6 Ref., Il.

Cassava. Xanthomonas campestris pv. manihotis. Cassava bacterial blight. Pruning. Plant physiology. Nigeria.

The rate at which exudates of Xanthomonas manihotis, the causal agent of CBB, erupted along cassava green shoots from the point of infection showed that the bacteria moved very rapidly upwards, but the movement down the shoot was restricted. The bacteria were isolated from the point of infection up the tip but only for a short distance below the point of infection, and they persisted for more than 9 wk. in these tissues. Young shoots sprouting from any node above the point of infection were infected, but infection in those from nodes 12 cm below this point was significantly less. Bacteria-free cuttings may be selected by pruning the infected

cutting at least 12 cm below the point of infection which is marked in older stems by the lowest canker region. (AS)

0446

28167 ARENE, O.B. 1977. Field evaluation of Agrimycin 500 for the control of cassava bacterial blight. Nigerian Journal of Plant Protection 3:90-93. En., Sum. En., 5 Ref.

Cassava. Cassava bacterial blight. Xanthomonas campestris pv. manihotis. Bacterioses. Disease control. Nigeria.

Agrimycin 500, a formulation of antibiotics and fungicide (terramycin, 0.176 percent; streptomycin, 1.755 percent; copper sulfate, 80 percent) was evaluated for the control of Xanthomonas manihotis in a complete randomized block expt. in Nigeria. There were 3 methods of application (dip, foliar, and foliar + dip) for the 5 dosage levels used (0, 400, 600, 800, and 1000 g/100 liters of water). Analysis of variance indicated only a significant F-value for dosage level; however, Duncan multiple-range tests suggested that incidence and severity were significantly reduced by foliar application of Agrimycin 500 at the rate of 800 g/100 liters of water. (AS)

0447

28168 ARENE, O.B. 1977. Susceptibility of Nigerian local cassava cultivars to cassava bacterial blight and cassava mosaic disease. Umudike, Nigeria, National Root Crops Research Institute. 27p. En., Sum. En., 5 Ref. Paper presented at the 13th Annual Conference of the Agricultural Society of Nigeria, Zaria, 1977.

Cassava. Cassava bacterial blight. Cassava African mosaic virus. Cultivars. Resistance. Plant breeding. Selection. Adaptation. Nigeria.

In a systematic survey, collection and screening of cassava germplasm throughout Nigeria, 766 cv. were assembled at the National Root Crops Research Institute in Umudike between 1973-75. Evaluation of these cv. for resistance to CBB and CAMD has shown that about 14.3 percent of FDAR/Imo/Anambara collections show resistance to CBB and 42.5 percent to CAMD; about 33 percent show resistance to CBB and 40 percent to CAMD in Bendel collections. However, due to considerations of other breeding parameters, only 197 cv. have been selected as source of entries for the multilocational trials being conducted in 9 regions of the country. (AS)

0448

28397 GROUSSON, F. 1986. Variabilité de Xanthomonas campestris pathovar manihotis. (Variability of Xanthomonas campestris pathovar manihotis). These Docteur Ing. France, L'Institut National Agronomique Paris-Grignon. 152p. Fr., Sum. Fr., En., 235 Ref., Il.

Cassava. Xanthomonas campestris pv. manihotis. Cassava bacterial blight. Cultivars. Laboratory experiments. Resistance. South America. Africa. France.

The variability of 54 strains of Xanthomonas campestris pv. manihotis (causal agent of CBB) from South America, 9 African countries, and various parts of Congo was studied. Leaf and stem inoculations on 2 cassava cv. allowed the reproduction of the different symptoms observed in the field. The difference of susceptibility between both cv. was clear on the leaves but less on the stems. Four pathogenic groups of strains were defined on the basis of inoculation results. The influence of geographical origin varied for certain countries or areas. In vitro, strains of X. campestris pv. manihotis were relatively homogenous. Nevertheless, a study of their growth on different substrates, their response to several antibiotics, and

phage typing showed variability, not related to the geographical origin. Each characteristic allowed a stable partition from the set of strains to be defined. Finally, the synthesis of all the results in vivo and in vitro by a multiple factorial analysis showed the existence of a common factor to the different studied characteristics. A link exists between strain pathogenicity and its in vitro behavior. (AS)

0449

27635 KITAJIMA, E.W.; VAINSTEIN, M.H.; SILVEIRA, J.S.M. 1986. Flagellate protozoon associated with poor development of the root system of cassava in the Espirito Santo State, Brazil. Phytopathology 76(6):638-642. En., Sum. En., 22 Ref., Il. [Depto. de Biologia Celular, Univ. de Brasilia, 70.910 Brasilia-DF, Brasil]

Cassava. Root development. Cultivars. Xanthomonas campestris pv. manihotis. Vectors. Propagation. Brazil.

"Chochamento das raizes" (empty roots) is a problem of increasing importance in cassava crops in northern Espirito Santo, Brazil. It particularly affects the cv. Unha, the most cultivated in this region, and is characterized by poor development of the root system and general chlorosis of the aerial parts. A flagellate protozoon (Phytomonas sp.) was found associated with the diseased plants, living in the laticifer ducts. The protozoon is easily detected by light microscopy in the smears of latex exuded from cut wounds. Under the electron microscope, the flagellates show the typical subpellicular layer of microtubules, single flagellum with 9+2 axial complex and paraxial structure, basal body, and kinetoplast. Field surveys showed that about 50 percent of the chlorotic Unha cassava plants contained the flagellate in the latex, whereas none was found in symptomless plants. Under greenhouse conditions, the flagellate was transmitted only by grafting. Attempts to transmit the protozoon by injecting or pricking latex suspensions into healthy plants or using a Tingidae hemiptera (Vastiga sp.) as vector have been unsuccessful. (AS)

0450

28590 LOZANO, J.C.; LABERRY, R.; BERMUDEZ, A. 1986. Microwave treatment to eradicate seed-borne pathogens in cassava true seed. Phytopathologische Zeitschrift 117(1):1-8. En., Sum. En., De., 9 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Xanthomonas campestris pv. manihotis. Diplodia manihotis. Fusarium. Cladosporium. Colletotrichum. Diplodia. Disease control. Disease transmission. Seed. Germination. Seed treatment. Colombia.

A high percentage of cassava seeds, collected from 5 different edaphoclimatic zones in Colombia, were found infected by several fungal and bacterial pathogens. The incidence and severity of seed infections were not correlated with the climatic conditions at harvest. These pathogens were eradicated from seeds by a microwave oven treatment (1400 W heating power, 2450 MHz) for 120 s. The effectiveness of this treatment depended on reaching an optimum temp. of 77 degrees Celsius. Several factors, such as container capacity, water vol., and seed no., can affect the time required to reach 77 degrees Celsius. A thiram dust treatment after microwave exposure reduced seed reinfestation. (AS)

0451

28395 PERREAUX, D.; MARAITE, H.; MEYER, J.A. 1986. Detection of 3 (methylthio) propionic acid in cassava leaves infected by Xanthomonas campestris pv. manihotis. Physiological and Molecular Plant Pathology

28:323-328. En., Sum. En., 11 Ref., Il. [Laboratoire de Phytopathologie, Univ. Catholique de Louvain, 3, Place Croix du Sud, B-1348 Louvain-la-Neuve, Belgium]

Cassava. Xanthomonas campestris pv. manihotis. Leaves. Analysis. Laboratory experiments. Belgium.

The blight inducing toxin 3(methylthio)propionic acid was detected by gas liquid chromatography in extracts of cassava leaves, naturally or artificially infected by Xanthomonas campestris pv. manihotis. The highest toxin concn. (6 micrograms/g fresh wt.) was associated with the appearance and extension of the blight symptoms in artificially infected leaves. S-containing compounds, more volatile than 3(methylthio)propionic acid, were also observed in necrotic tissues. One of them was identified by peak amplification as thiopropionic acid. (AS)

0452

28322 VAN DEN MOOTER, M.; MARAITE, H.; MEIRESONNE, L.; SWINGS, J.; GILLIS, M.; KERSTERS, K.; DE LEY, J. 1987. Comparison between Xanthomonas campestris pv. manihotis (ISPP List 1980) and X. campestris pv. cassavae (ISPP List 1980) by means of phenotypic, protein electrophoretic, DNA hybridization and phytopathological techniques. Journal of General Microbiology 133:57-71. En., Sum. En., 38 Ref., Il. [Laboratorium voor Microbiologie en microbiele Genetica, Rijksuniversiteit, Ledeganckstraat 35, B-9000 Gent, Belgium]

Cassava. Xanthomonas campestris pv. manihotis. Xanthomonas campestris pv. cassavae. Hybridization. Cytogenetics. Cassava bacterial blight. Xanthomonas campestris pv. poinsettiicola. Euphorbia pulcherrima. Diseases and pathogens. Belgium.

Xanthomonas campestris pv. manihotis and X. campestris pv. cassavae strains, isolated from cassava plants of different geographical origin, were studied by numerical analysis of 267 phenotypic features, computer-assisted comparison of gel electrophoregrams of soluble proteins, mol percentage G+C determinations, DNA:DNA hybridizations, and virulence tests. X. campestris pv. manihotis and pv. cassavae constituted separate biological entities which could be differentiated from each other by 4 biochemical features, their symptoms on cassava, their soluble protein electrophoregrams, and their DNA characteristics. Within each pathovar no correlation was found between phytopathogenicity, geographic origin, and year of isolation of the strains, on one hand, and the biochemical, physiological, and protein electrophoretic properties on the other. Two yellowish Xanthomonas strains, CIAT 1164 and CIAT 1165, isolated from cassava in Colombia were genetically and electrophoretically similar to X. campestris pv. poinsettiicola, but were unable to infect Euphorbia pulcherrima. X. campestris pv. poinsettiicola was genetically more related to the X. campestris pv. manihotis cluster than to the X. campestris pv. cassavae cluster. (AS) See also 0407 0468 0549 0567 0586 0587 0616

203 Mycoses

0453

28169 ARENE, O.B. 1978. Root diseases of cassava. Umudike, Nigeria, National Root Crops Research Institute. 16p. En., Sum. En., 6 Ref. Paper presented at the 8th Annual Conference of the Nigerian Society for Plant Protection, Benin City, 1978.

Cassava. Sclerotium rolfsii. Fomes lignosus. Rosellinia necatrix. Phytophthora. Disease control. Mycoses. Diseases and pathogens. Root productivity. Symptomatology. Nigeria.

The status of the present research carried out at the National Root Crops Institute (Nigeria) on the root diseases caused by Sclerotium rolfsii, Fomes lignosus , Rosellinia necatrix, and Phytophthora spp. is presented. Information on diagnostic symptoms, epiphytotics, and control is given. Attempts are also made to highlight the challenges cassava root diseases still pose to plant protectionists. (CIAT)

0454

28134 BRUDZYNSKI, A. 1985. L'incidence d'Aspergillus flavus et d'autres especes de moisissures dangereuses dans la mycoflore du mais, d'arachides et de cossettes du manioc vendues sur le marché de Kisangani. (The occurrence of Aspergillus flavus and other dangerous molds in the mycoflora of maize, groundnuts, and cassava roots sold at the Kisangani market). Industries Alimentaires et Agricoles 102(4):307-309. Fr., Sum. Fr., 9 Ref.

Cassava. Mycoses. Aspergillus. Penicillium. Fusarium. Phytophthora. Rhizopus. Cladosporium. Curvularia. Monilia. Tricothecium. Nigrospora. Rhodotorula. Aflatoxin. Molds. Storage. Zaire.

The results are presented of an analysis of mycotoxin producing fungi, pathogenic to both animals and humans, in some products (among them, cassava) sold at Kisangani market, Zaire, after being stored for 1 mo. or more. Twelve genera of fungi were identified, the most important being Aspergillus, Penicillium, and Fusarium, followed by Phytophthora, Rhizopus, Cladosporium, Curvularia, and Monilia; the most uncommon were Tricothecium, Nigrospora, and Rhodotorula. A. flavus was found in 20 percent of the cassava samples analyzed and the species A. candidus, A. clavatus, A. luchuensis, and A. niger were each found in 13 percent of the samples analyzed. These species also formed part of the air mycoflora. Climatic conditions in Kisangani (25 degrees Celsius and 85 percent RH) favor the development of fungi; this, along with the presence of spores in the air, indicate that mycotoxins (above all aflatoxins) constitute a permanent danger to food products. (CIAT)

0455

28400 HERRERA, I.; CUPULL S., R. 1985. Medios de cultivos para hongos fitopatógenos en regiones tropicales. (Culture media for plant pathogenic fungi in tropical). Centro Agrícola 12(1):148-152. Es., 2 Ref. [Depto. de Sanidad Vegetal, Facultad de Ciencias Agrícolas, Univ. Central de Las Villas, Cuba]

Cassava. Culture media. Mycoses. Tissue culture. Composition. Cuba.

The effectiveness of 4 root crops, including cassava, as substitutes of traditional crops (potato, oats, and malt) to produce culture media for in vitro plant pathogenic fungi tests, was evaluated by measuring the colony surface formed by 20 fungi after 48 h incubation at 28 degrees Celsius and the initiation of sporulation. Data are given for each fungus and for each culture media, including cassava-agar. The effectiveness of cassava is similar to the traditional PDA. (CIAT)

0456

27661 SIVANESAN, A. 1985. The teleomorph of Cercosporidium henningsii. Transactions of the British Mycological Society 84(3):551-555. En., Sum. En., 7 Ref., Il. [Commonwealth Mycological Inst., Kew, Surrey TW9 3AF, England]

Cassava. Cercosporidium henningsii. Mycosphaerella henningsii. Identification. England.

Mycosphaerella henningsii nom.nov. (synonym M. manihotis Ghesquiere & Henrard) is redescribed and illustrated as the teleomorph of Cercosporidium henningsii. M. manihotis Ghesquiere & Henrard (1924) is correlated with C. henningsii (Allescher) Deighton. Unfortunately it is necessary to provide a new name for this teleomorph because it is a later homonym of M. manihotis H. Sydow & P. Sydow (1901). The name M. henningsii nom.nov. is therefore proposed for this species. It is redescribed and illustrated with its anamorph, and compared with M. manihotis for which no anamorph is known. Although the genetic connexion between the teleomorph and the anamorph has yet to be established in culture, it is undoubtedly suggested by connexion to each other by a common stroma and mycelia and by the development of ascostroma in a stroma bearing conidiophores and conidia. (AS) See also 0403 0407 0450

E04 Viroses

0457

28182 ARENE, O.B. 1972. Cassava mosaic virus: progress and problems. Umudike, Nigeria, National Root Crops Research Institute. 11p. En., 28 Ref. Paper presented at the Annual Conference of Nigerian Society for Plant Protection, Benin City, 1972.

Cassava. Cassava African mosaic virus. Bemisia tabaci. Resistance. Hybridizing. Propagation. Cultivars. Productivity. Bemisia nigeriensis. Nigeria.

The problems and progress in research in Africa regarding the following aspects of the CAMV are reviewed: symptoms, effects on cassava yields, transmission by Bemisia spp. vectors, var. improvement for resistance through screening and intraspecific and interspecific hybridization, and control through heat therapy and meristem propagation. (CIAT)

0458

28184 ENYINNIA, T. 1984. Cassava mosaic disease (CMD) and its control. Umudike, Umuahia, Nigeria, National Root Crops Research Institute. Agricultural Extension Research Liaison & Training. Extension Bulletin no.9. 6p. En., 3 Ref., Il.

Cassava. Cassava African mosaic virus. Disease control. Diseases and pathogens. Technology transfer. Cultivars. Fertilizers. Resistance. Symptomatology. Nigeria.

General information on symptoms, causal agent (unknown), spread, factors affecting severity, and control of CAMD is presented. Improved cassava var. showing resistance to CAMD in Nigeria include TMS 30572, TMS 30211, TMS 30395, U/41044, and U/42215. Adequate fertilization is also recommended for CAMD control. (CIAT)

0459

28124 MALATHI, V.G.; NAIR, N.G.; SHANTHA, P. 1985. Cassava mosaic disease. Kerala, India, Central Tuber Crops Research Institute. Technical Bulletin Series no.5. 21p. En., 22 Ref., Il.

Cassava. Cultivars. Cassava mosaic virus. Disease transmission. Epidemiology. Disease control. Symptomatology. Bemisia. Plant injuries.

Productivity. Tissue culture. Physiological disorders. Leaves. Resistance. India.

Research results on the transmission, spread, epidemiology, and control of cassava mosaic in India are summarized. Disease symptomatology is indicated and an indexing system to evaluate materials for resistance, based on foliar symptoms on a 1-5 scale, is given. Disease severity indexes are give for local cv. Kalikalan, M 4, and the hybrids H 226 and H 2304. Studies indicated that H 226 and Kalikalan possess a geminivirus serologically related but different from its counterpart in African countries. The virus was sap-transmissible to Nicotiana benthamiana and N. glutinosa, but not from cassava to cassava or from tobacco to cassava. Cassava mosaic could be transmitted by grafting. Studies on the transmission by the vector Bemisia tabaci indicated that the percentage transmission was negligible on the different test var. used. No correlation was found between whitefly preference for feeding and disease incidence. The mosaic was not seed transmissible. Disease cycle, epidemiology, and spread in different agroclimatic conditions are discussed as well as the biochemical changes that occur in cassava plants, especially regarding leaf anatomy. Yield losses due to mosaic varied with the different var. The highest percentage of yield reduction was observed in var. Kalikalan. Based on the different studies on control measures, it was concluded that the careful selection of healthy material of resistant var. together with periodic roguing of diseased plants gives an adequate disease control. The methodology used for the identification of resistant var. through grafting tests and bombardment trials (in which each plant has at least 1 infected plant as neighbor) is discussed. The tissue culture procedure adapted for disease elimination is briefly described. (CIAT)

0460

28572 STANLEY, J.; TOWNSEND, R. 1986. Infectious mutants of cassava latent virus generated in vivo from intact recombinant DNA clones containing single copies of the genome. Nucleic Acids Research 14(15):5981-5998. En., Sum. En., 30 Ref., Il. [Dept. of Virus Research, John Innes Inst., Colney Lane, Norwich NR4 7UH, England]

Cassava. Cassava latent virus. Laboratory experiments. Diseases and pathogens. United Kingdom.

The potential to produce systemic infection in plants using intact recombinant clones is reported and a no. of progeny viral DNAs are characterized. Intact recombinant DNAs containing single copies of either component of the CLV genome were found to elicit infection when mechanically inoculated to host plants in the presence of the appropriate 2nd component. Characterization of infectious mutant progeny viruses, by analysis of virus-specific supercoiled DNA intermediates, indicated that most if not all of the cloning vector has been deleted, achieved at least in some cases by intermolecular recombination in vivo between DNAs 1 and 2. Significant rearrangements within the intergenic region of DNA 2, predominantly external to the common region, can be tolerated without loss of infectivity suggesting a somewhat passive role in virus multiplication for the sequences in question. Although packaging constraints might impose limits on the amount of DNA within geminate particles, isolation of an infectious coat protein mutant defective in virion production suggests that packaging is not essential for systemic spread of the viral DNA. (AS)

0461

28558 THOMAS, J.E.; MASSALSKI, P.R.; HARRISON, B.D. 1986. Production of monoclonal antibodies to African cassava mosaic virus and differences in their reactivities with other whitefly-transmitted geminiviruses. Journal of General Virology 67:2739-2748. En., Sum. En., 27 Ref. [Queensland Dept.

of Primary Industries, Meiers Road, Indooroopilly, Queensland 4068, Australia]

Cassava. Cassava African mosaic virus. Aleyrodidae. Bemisia. Disease transmission. Antibodies. Toxicity. Australia.

A panel of murine monoclonal antibodies (MAbs), selected by indirect ELISA, was prepared to an isolated (ACMV-JI) of the type strain of African cassava mosaic virus. Of the 10 MAbs purified from ascitic fluids, 4 out of the 5 tested gave stronger reactions with ACMV-JI in double antibody sandwich ELISA than did rabbit polyclonal antibody. Six of the 10 MAbs gave a precipitin reaction in immunodiffusion tests and 9 trapped ACMV-JI particles in immunosorbent electron microscopy. Rabbit polyclonal antibody to ACMV reacted in double antibody sandwich-ELISA not only with ACMV-JI and the Kenya coast strain of ACMV (ACMV-C) but also with 5 other geminiviruses known or suspected to have the whitefly Bemisia tabaci as a vector, though not with 3 geminiviruses that have leafhopper or unknown vectors. Of the 10 MAbs studied in detail, 4 did not react with ACMV-C in indirect ELISA and only 2 reacted strongly. This supports other evidence that ACMV-C is a distinctive strain of ACMV and not merely a minor variant. The other whitefly-transmitted geminiviruses (BGMV, euphorbia mosaic, mung bean yellow mosaic, and tomato golden mosaic viruses) and Australian tomato leaf curl virus reacted with 2-5 MAbs but each virus had a different pattern of reactivity. In contrast, solanum apical leaf curling virus, and the leafhopper-transmitted beet curly top and maize streak viruses, did not react with any of the MAbs. The results of competitive binding tests, when combined with the patterns of reaction of individual MAbs with different viruses, indicated that the MAbs were specific for 9 distinct epitopes. Two MAbs reacted with all 5 whitefly-transmitted viruses, suggesting that the epitopes detected by these MAbs may be important for transmission by B. tabaci. Individual MAbs seem suitable for detecting and identifying ACMV, for distinguishing between ACMV-JI and ACMV-C, and for quantitative assays of other whitefly-transmitted geminiviruses. (AS)

0462

27639 ZETTLER, F.W.; ELLIOTT, M.S. 1986. An antigenically distinct strain of cassava common mosaic virus infecting Cnidoscolus aconitifolius. Phytopathology 76(6):632-638. En., Sum. En., 20 Ref., Il. [Dept. of Plant Pathology, Univ. of Florida, Gainesville, FL 32611, USA]

Cassava. Cassava common mosaic virus. Viroses. Laboratory experiments. USA.

A strain of cassava common mosaic virus (CCMV-Ch) was detected in plants of chaya (Cnidoscolus aconitifolius) grown in Florida, USA. The virus induced systemic mosaic symptoms in manually inoculated plants of chaya, cassava Ricinus communis, Euphorbia spp., Jatropha spp., and Nicotiana benthamiana. Local lesions were induced in Cassia occidentalis, Chenopodium amaranticolor and C. quinoa, Datura stramonium, and Gomphrena globosa. Of 140 flexous rod-shaped virus particles measured in negatively stained leaf extracts of N. benthamiana, 77 percent were 473-543 nm long, with a main max. at 520 nm. Cytoplasmic inclusions seen by light and electron microscopy in infected leaves of chaya and N. benthamiana were similar to those previously described for cassava common mosaic and other potexviruses. Up to 1.67 mg of purified CCMV-Ch/g of infected leaf tissue of N. benthamiana was obtained by clarification in n-butanol and chloroform, 2 precipitations with 8 percent (final concn.) polyethylene glycol 6,000, and differential centrifugation. Max. CCMV-Ch antigen titers of 1/256, 1/16, and 1/8 occurred in leaf extracts of N. benthamiana, cassava, and chaya, resp., when subjected to double diffusion tests (0.8 percent Noble agar, 0.5 percent SDS, 1.0 percent NaN3). Reciprocal SDS immunodifusion and unilateral double antibody sandwich ELISA tests showed

that CCMV-Ch is serologically related to, but distinct from, 9 cassava isolates of CCMV from Brazil, Colombia, and Taiwan. CCMV-Ch could not be serologically distinguished from a chaya CCMV isolate from Yucatan, Mexico. (AS) See also 0447 0500 0549 0567 0586 0604 0616

F00 PEST CONTROL AND ENTOMOLOGY

0463

28534 LAWANI, S.L. 1987. Combating pests and diseases of tropical root and tuber crops. Courier no.101:85-88. En., Sum. En., Il. [International Inst. of Tropical Agriculture, P.M.B. 5320, Ibadan, Nigeria]

Cassava. Pest control. Biological control. Epidinocarsis lopezi. Diseases and pathogens. Cultivars. Phenacoccus manihoti. Mononychellus. Resistance. Nigeria.

The stategies being developed in Africa for the control of major pests and diseases of root and tuber crops, among them cassava, are briefly reviewed. A positive relationship has been observed in breeding for resistance to CAMD and CBB, the major cassava diseases in Africa; approx. 12 high yielding and resistant cassava var. have been released by International Institute of Tropical Agriculture in 11 countries and tissue cultures have been sent to 31 countries of the region. Successful biological control programs have been conducted to control Pheracoccus manihoti in several countries through mass releases of the predator Epidinocarsis lopezi; the aim is to establish a complex of enemy species. Work on the biological control of Monorychellus spp., another of the major pests in the region, is still at an early stage and emphasis has been placed on the use of 3 phytoseiid mite predators, introduced from South America. (CIAT) See also 0443 0571 0580 0592 0619

F01 Injurious Insects and their Control

0464

28515 ANUEBUNWA, F.O.; FLUAGU, L.S. 1982. Cassava mealybug/green spider mite infestations and the demand for foodgrains in Nigeria: a case study of Anambra State. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.123-133. En., Sum. En., 4 Ref.

Cassava. Phenacoccus manihoti. Mononychellus tanajoa. Pest damage. Pest control. Statistical data. Socioeconomic aspects. Gari. Nigeria.

The demand for food grains (rice, maize, beans) was determined as well as the related elasticities, based on time-series data and information on prices, consumption or expenditure patterns, and cassava mealybug (Phenacoccus manihoti) and green spidermite (Mononychellus tanajoa) infestations in Anambra State, Nigeria. The study indicated a high expenditure elasticity for maize, which reflects an increasing demand for maize as a result of its new uses (maize flour) that now substitutes and, in some cases, complements gari. The change in preference in favor of maize is principally the result of the increasing price of cassava roots or gari, which in turn is a consequence of P. manihoti and M. tanajoa infestations. (CIAT)

0465

29501 ARIAS V., B.; BELLOTTI, A.C. 1984. Pérdidas en rendimiento (daño simulado) causadas por Erinnyis ello (L.) y niveles críticos de población en diferentes etapas de desarrollo en tres clones de yuca. (Yield losses (simulated damage) caused by Erinnyis ello and critical population levels in different development stages of three cassava clones). Revista Colombiana de Entomología 10(3-4):28-35. Es., Sum. Es., En., 11 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Erinnyis ello. Root productivity. Propagation materials. Starch content. Ecosystems. Clones. Productivity. Soil fertility. Defoliation. Leaf area. Developmental stages. Colombia.

The losses of root yield, planting material, and percentage of starch due to Erinnyis ello were determined in 2 different ecosystems by means of simulated damage: complete (100 percent) defoliation once or twice (at 1-mo. interval). A total of 4 expt. were conducted in Santander de Quilichao (Cauca), a site with poor soils, and at CIAT-Palmira, a fertile site. The no. of 5th-instar larvae needed to cause this defoliation at each one of the development stages (mo. 1-5, 7, and 9) was determined. Three cassava clones were used: M Mex 59, CM 305-41, and MMC 2 with wide, intermediate, and narrow leaves, resp. Results showed that yield losses in sites with poor soils can reach 64.0 percent when there are 2 consecutive defoliations and 46.0 percent after 1 defoliation. In fertile soils, losses reached 47.0 and 25.5 percent with 2 and 1 defoliations, resp. The greatest losses of planting material resulted when plants were defoliated twice at 1 and 2 mo. of age, and once at 1 mo. of age (72 and 62 percent, resp.). Decreases in the percentage of starch in the roots occurred when plants 7 mo. old or older were defoliated. (AS)

0466

28511 ATU, U.G.; OKEKE, J.E.; CHINAKA, C. 1982. Granular insecticide for control of cassava mealybug (Phenacoccus manihoti). In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.99-103. En., Sum. En., 10 Ref.

Cassava. Phenacoccus manihoti. Insecticides. Nigeria.

Carbofuran at 1.5 kg a.i./ha was tested in 1 application at planting or in 2 applications, 1 at planting and the other after 6 wk., to control Phenacoccus manihoti in cassava var. 30211 planted in Umudike, Nigeria. No significant differences were observed in the no. of plants attacked by P. manihoti at 3 mo. between 1 or 2 applications (73 and 76 percent reductions, resp.). Plant height was also higher with carbofuran treatments: 34 and 23 cm taller than the control plants under shade and in the field, resp., for 2 applications and 28 and 14 cm taller than the control plants, resp., for 1 application. For carbofuran to be effective, applications should be conducted when there is enough soil moisture (at planting at the end of the rains). (CIAT)

0467

28375 ATU, U.G.; OKEKE, J.E. 1981. Effect of insecticide application on cassava yield in control of cassava mealytug (Phenacoccus manihoti). In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.61-68. En., Sum. En., 6 Ref.

Cassava. Phenacoccus manihoti. Insecticides. Cultivars. Productivity. Canopy. Nigeria.

The effect of insecticides (diazinon, dimethoate, methidathion, monocrotophos, and phosphamidon) used to control Phenacoccus manihoti on yields of cassava var. 30211, harvested 10 mo. after application, was studied in Umudike, Nigeria. Insecticides were applied to 4-mo.-old plants. No significant top yield differences were observed among treatments, except for diazinon which yielded significantly higher than the control (26.6 vs. 17.6 t/ha, resp.). Diazinon followed by phosphamidon and methidathion were significantly better for root yield improvement compared with the control (32.3, 26.3, and 25.6 t/ha, resp., vs. 17.9 t/ha for the control). (CIAT)

0468

28345 ATU, U.G.; ARINZE, A.E. 1980. Control strategies for cassava mealy bug Phenacoccus manihoti. In NAFPP National Cassava Workshop, 4th., Umudike, Nigeria, 1980. Proceedings. Umudike, National Cassava Root Crops Research Institute. National Cassava Centre. pp.27-31. En., 6 Ref.

Cassava. Phenacoccus manihoti. Pest control. Biological control. Ecosystems. Predators and parasites. Cultivation. Insecticides. Exochomus flavipus. Hyperaspis pumila. Nigeria.

Integrated pest management strategies, which may be used alone or together, to control Phenacoccus manihoti in Nigeria are briefly discussed: (1) exclusion of pest through cassava cutting dips for 5 min in dimethoate or phosphamidon; (2) eradication, preferably through insecticide sprays (dimethoate, phosphamidon, monocrotophos); (3) cultural control through the use of adapted healthy planting material, early planting at the onset of rains, and proper soil fertility and soil moisture conservation methods; (4) biological control, hopefully through mass rearing and dissemination of the identified predators Exochomus flavipes and Hyperaspis pumila; and (5) chemical control, especially at the critical threshold level of the pest (dimethoate and phosphamidon). The disadvantages of this latter strategy are indicated. (CIAT)

0469

27677 COMMONWEALTH INSTITUTE OF BIOLOGICAL CONTROL. 1985. Cassava pests. In _____. Annual Report 1984-85. Slough, United Kingdom, Commonwealth Agricultural Bureaux. pp.6-7. En., Il.

Cassava. Phenacoccus manihoti. Injurious mites. Predators and parasites. Research. England. Africa.

The research work carried out by the Commonwealth Institute of Biological Control during 1984-85 on cassava pests is briefly reported. Cultures of natural enemies of Phenacoccus manihoti were maintained to supply material to the International Institute of Tropical Agriculture (IITA) in Nigeria. A new hymenopterous parasite, Allotropa sp., was received. With the collaboration of CIAT and the Glasshouse Crops Research Institute (United Kingdom), species of predatory mites were sent to IITA for trials against the mites Mononychellus spp. Phase IV of the project sponsored by the International Development Research Center on Mononychellus spp. was initiated to quantify losses in different cassava var. in eastern Africa. (CIAT)

0470

27680 COMMONWEALTH INSTITUTE OF BIOLOGICAL CONTROL. 1984. Cassava pests. In _____. Annual Report 1983-84. Slough, United Kingdom, Commonwealth Agricultural Bureaux. pp.6-7. En.

Cassava. Phenacoccus manihoti. Predators and parasites. Apoanagyrus lopezi. Injurious mites. Typhlodramalus limonicus. Oligota minuta. England. South America. Nigeria. Congo.

Research carried out by the Commonwealth Institute of Biological Control on cassava pests is briefly reported. Apoanagyrus lopezi, the most abundant parasite in South America and predator of Pheracoccus manihoti, a cassava pest, was released in Nigeria at the end of 1981 and continues to suppress the pest and to spread naturally. It is also established in Congo. Recently the predatory mite Typhlodramalus limonicus, which controls cassava mites (Mononychellus spp.), was sent from South America for onward shipment to Nigeria. Studies on the native mite predator complex continued; unfortunately no recoveries of the predator Oligota minuta have been made. (CIAT)

C471

28141 DUATIN, C.J.Y.; DE PEDRO, L.B. 1986. Biology and host range of the taro planthopper, Tarophagus proserpina Kirk. Annals of Tropical Research 8(2):72-80. En., Sum. En., 3 Ref., Il.

Cassava. Taro. Tarophagus proserpina. Insect biology. Philippines.

The biology of the taro planthopper (Tarophagus proserpina) was studied in the lab. using taro as food. The total developmental periods of the male and female T. proserpina are approx. 30.86 and 31.29 days, resp. The insect undergoes 5 nymphal instars with a duration of 1.31 and 1.25 days in males and females for the 1st stadium to 17.58 and 17.50 days for the 5th stadium. Females live longer than males. Both sexes are morphologically similar except in size and genital structures. Low percentage mortality (8 percent) was observed during the 1st-3rd instar. Cassava is among the possible alternate hosts. Natural enemies observed on T. proserpina were ants, a species of predaceous mite belonging to Family Trobidiidae, and a minute gastropod. (AS (extract)

C472

28513 EMERUTE, J.K.U.; OKEKE, J.E.; ETIM, G.J.A. 1982. Cassava mealybug and their alternative host systems in Imo State, Nigeria. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.111-117. En., Sum. En., 5 Ref.

Cassava. Pheracoccus manihoti. Phenacoccus madeirensis. Pest control. Nigeria.

Cassava mealybug species and their alternative hosts in Imo State, Nigeria, are reviewed. Phenacoccus manihoti and P. madeirensis have been identified as causing severe damage to cassava in the region. While P. manihoti is specific to Manihot spp., P. madeirensis can establish itself in other host plants but still prefers Manihot spp.; this polyphagous habit makes the latter a more difficult pest to control. Since mealybugs are dry season pests, research at the National Root Crops Research Institute is providing evidence of effective pest control if cassava planting is carried out when rains are steady. The latter, together with resistant/tolerant var. or overhead irrigation for late crops, could reduce the economic importance of the pest in Nigeria. (CIAT)

C473

28570 FASORANTI, J.O.; OLAGUNJU, O.M. 1985. Food selection by the variegated grasshopper Zonocerus variegatus, L. Feeding bioassay using crops and weeds. Insect Science and its Application 6(6):681-686. En., Sum. En., Fr., 17 Ref., Il. [Dept. of Biological Sciences, Univ. of Ilorin, P.M.B. 1515, Ilorin, Nigeria]

Cassava. Zonocerus variegatus. Euphorbiaceae. Pest damage. Weeds. Insect control. Insect biology. Nigeria.

Observations are made on the quantification of the acceptability of plants to Zonocerus variegatus, a serious pest of cassava in Africa, as well as the effect of food--2 crops (cassava and Amarantus sp.) and 2 weeds (Euphorbia hirta and Tridax procumbens)--on its growth. Early instars of the insect fed on most weeds, but preferred those in the families Euphorbiaceae and Solanaceae. Plants that were accepted initially were lesser consumed than later chosen ones. Although there was no apparent difference between wt. of nymphs fed on cassava and other plants in the 1st 9 wk., thereafter cassava-fed insects excelled others. Somatic growth was not affected by feed type. (AS)

0474

28510 HAHN, S.K.; HERREN, H.R. 1982. Cassava mealybug control strategy: IITA's approach. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute, National Cassava Centre. pp.91-98. En., Il.

Cassava. Phenacoccus manihoti. Pest control. Biological control. Predators and parasites. Resistance. Hyperaspis. Scymnus. Apoanagyrus lopezi. Clones. Exochomus. Plant breeding. Nigeria.

Strategies used by the International Institute of Tropical Agriculture to control Phenacoccus manihoti attacking cassava are reviewed. Biological control of the pest has been successful with the introduced predators Hyperaspis sp. and Scymnus sp. and the parasitoid Apoanagyrus lopezi. It is expected that biological control in combination with host plant resistance will reduce P. manihoti problem in Africa in the future. Cassava breeding is aimed at incorporating higher hair density on the surface of young cassava leaves and the development of glabrous clones that keep P. manihoti populations at a low level. Antibiosis, on the other hand, appears to be effective in clone 70453 in on-going expt. (CIAT)

0475

28127 INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE. 1985. Biological control of cassava mealybug and green spider mites. Ibadan, Nigeria, Biological Control Project. Information series no.16. 25p. En., Sum. Fr., Il.

Cassava. Phenacoccus manihoti. Mononychellus. Biological control. Epidinocarsis lopezi. Predators and parasites. Africa. Nigeria.

The progress in the biological control of Phenacoccus manihoti and Mononychellus spp., 2 serious cassava pests in Africa, is surveyed. Insect appearance, biology, and control strategies are briefly described. Successful control of P. manihoti has been achieved with the parasitoid Epidinocarsis lopezi, which was 1st released in Ibadan (International Institute of Tropical Agriculture, Nigeria) in 1981-82. In the case of Mononychellus spp. 11 predatory mites have proved successful in controlling the pest with high predation rates and good establishment in the field. The campaign for mass-rearing and distribution of the biological control agents is briefly described. (CIAT)

0476

28112 MAKUNDI, R.H. 1986. The toxicity of deltamethrin and cyfluthrin to the larger grain borer, Prostephanus truncatus (Horn) (Coleoptera:Bostrychidae). International Pest Control 28(3):79-81. Fr., Sum. En., 9 Ref., Il. [Larger Grain Borer Control Project, Ministry of Agriculture, P.O. Box 9192, Dar-es-Salaam, Tanzania]

Cassava. Prostephanus truncatus. Insecticides. Storage. Insect control. Tanzania.

An outbreak of Prostephanus truncatus, a serious pest of stored maize and dried cassava, was reported in Tanzania about 3 yr ago. Lab. results on the efficiency of 2 synthetic pyrethroids, deltamethrin and cyfluthrin, against P. truncatus are presented. Deltamethrin (LD50 = 0.0063 microgram/insect) was more toxic than cyfluthrin (LD50 = 0.00217 microgram/insect) by topical application. The 2 pyrethroids were similarly synergized at the 1:5 ratio by topical application, and the dosages leading to 100 percent mortality of adult P. truncatus were considerably reduced by piperonyl butoxide at 1:10 ratio. Evaluation of deltamethrin and cyfluthrin dusts over a 4-wk. period has indicated their possible potential for future control application. (AS)

0477

26394 NEUENSCHWANDER, P.; SCHULTHESS, F.; MADOJEMU, E. 1986. Experimental evaluation of the efficiency of Epidinocarsis lopezi, a parasitoid introduced into Africa against the cassava mealybug Phenacoccus manihoti. Entomologia Experimentalis et Applicata 42(2):133-138. En., Sum. En., Fr., 18 Ref., Il. [International Institute of Tropical Agriculture, Ibadan, Nigeria]

Cassava. Predators and parasites. Epidinocarsis lopezi. Phenacoccus manihoti. Biological control. Experiment design. Nigeria.

The capability of Epidinocarsis lopezi to control the cassava mealybug (Phenacoccus manihoti) was investigated in Nigeria using physical and chemical exclusion expt. In 2 sleeve cage expt. mealybug populations, about 2 mo. after artificial infestation, were 7.0 and 2.3 times lower on artificially infested cassava tips covered with open cages than on tips in closed cages which excluded most parasitoids. On similarly infested but uncovered tips, mealybug populations were 24.3 and 37.5 times lower, and parasitization rates were higher. In an artificially infested field treated weekly with carbaryl, parasitization rates were below 10 percent and mealybug populations exceeded 200/tip. In the chemically untreated plot, parasitization rates were up to 25 percent and mealybug densities were mostly below 10/tip. The efficiency of E. lopezi in controlling its host under the exptl. conditions was demonstrated. (AS)

0478

28152 ODEBIYI, J.A.; BOKONON-GANTA, A.H. 1986. Biology of Epidinocarsis (= Apoanagyrus) lopezi (Hymenoptera: Encyrtidae) an exotic parasite of cassava mealybug, Phenacoccus manihoti (Homoptera:Pseudococcidae) in Nigeria. Entomophaga 31(3):251-260. En., Sum. Fr., Fr., 8 Ref., Il. [Dept. of Agricultural Biology, Univ. of Ibadan, Nigeria]

Cassava. Predators and parasites. Epidinocarsis lopezi. Phenacoccus manihoti. Ecosystems. Insect biology. Nigeria.

The biology of Epidinocarsis (= Apoanagyrus) lopezi was studied under fluctuating lab. conditions of 24-31 degrees Celsius and 79-90 percent RH. It is a solitary internal parasite with 4 tailed larval instars. The total developmental time from egg to adult ranged from 11 to 29 days (av. 18 days). The duration of each developmental stage was: egg 2 days, 1st instar 1 day, 2nd instar 1 day, 3rd instar 2 days, 4th instar 2 days, prepupa 4 days, and pupa 6 days. Males mated several times, females mated once. Mated females produced both males and females, unmated females produced only males. Mated ovipositing females lived for 13 days while nonovipositing mated females lived for 25 days. Parasitization decreased with increasing host density from 30 percent at a density of 10 hosts/plant/female to 11 percent at a density of 50. There was virtually no preoviposition period. Based on 10 females, the highest mean daily progeny production was 10. Females have an av. oviposition period of 11 days and an av. of 67 adult progeny. The sex ratio was 1:2.3 in favor of females. (AS)

0479

29500 VARGAS H., O.; BELLOTTI, A.C. 1984. Pérdidas en rendimiento causadas por Phenacoccus herreri Cox & Williams en dos clones de yuca. (Yield losses caused by Phenacoccus herreni Cox & Williams in two cassava clones). Revista Colombiana de Entomología 10(3-4):41-46. Es., Sum. Es., En., 9 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Phenacoccus herreni. Phenacoccus manihoti. Pest damage. Productivity. Clones. Growth. Cuttings. Starch content. Plant height. Colombia.

The yield losses that Phenacoccus herreni can cause to cassava plants under CIAT-Palmira conditions were determined. Var. M Col 22 and CMC 40 were used in a split-plot exptl. design. Three-mo.-old cassava plants were artificially infested with 1 ovisac and 2 adult females/plant. The following data were recorded monthly: plant height, degree of infestation and degree of damage. At harvest, yield, no. of commercial roots, no. of selected cuttings, and starch content were determined. Results indicate that the var. M Col 22 and CMC 40 had yield losses of 88.3 and 67.9 percent, resp. Plant height can be reduced up to 33 percent, affecting the no. and quality of the selected cuttings. Depending on the var., cutting losses can reach 74 percent. The degrees of infestation and of damage showed highly significant differences within treatments; there was a 22.5 percent difference in the degree of mealybug infestation between M Col 22 and CMC 40. The reduction in starch content was higher for M Col 22 (16.1 percent) than for CMC 40 (4.9 percent). These results show that the mealybug P. herreni can cause severe yield losses in cassava crops in areas with favorable environmental conditions for the pest. (AS (extract))

0480

27655 MORAGHAN, A. 1985. Cassava and cassava pests in Africa. FAO Plant Protection Bulletin 33(3):101-108. En., Sum. En., Fr., Es., 28 Ref., Il. [IITA, Oyo Road, P.M.B., Ibadan, Nigeria]

Cassava. Plant geography. Pests. Pest control. Biological control. Technology transfer. Phenacoccus manihoti. Africa.

The origin, distribution, adaptation, and uses of cassava and its by-products are outlined, as well as field problems associated with the crop, such as weeds, bacteria, fungi, and nematodes, in Africa. The problem of the cassava mealybug, a major pest, is discussed and its effect on yield losses indicated. Remedial international and cooperative action now in progress and the present status of biological control and training needs are described. A schedule for achieving control targets is indicated. (AS)

0481

27696 WOODRUFF, R.E.; BARANOWSKI, R.M. 1985. Metamasius hemipterus (Linnaeus) recently established in Florida (Coleoptera:Curculionidae). Gainesville, Florida Department of Agriculture and Consumer Services, Division of Plant Industry. Entomology Circular no.272. 4p. En., 17 Ref., Il. [Florida Dept. of Agriculture & Consumer Services, Division of Plant Industry, P.O. Box 1269, Gainesville, FL 32602, USA]

Cassava. Metamasius hemipterus. Insect biology. Insect control. Roots. Plant injuries. USA. Colombia.

The history, morphology, taxonomy, distribution, biology, detection, and control of Metamasius hemipterus is briefly described. This pest, found in North, Central, and South America, the Caribbean, and Africa, attacks sugarcane, banana, and other tropical plants, in particular when they are damaged or decaying. In 1984 M. hemipterus was reported for the 1st time in

continental USA, infesting cassava roots in Florida. Surveys carried out indicated that the pest has not yet spread to other plant species. Traps consi ing of cut bamboo sections filled with fermenting sugarcane have been successfully used in Colombia; they could be used to monitor and control the pest in Florida if necessary. (CIAT) See also 0407 0411 0461 0483 0583 0616

F03 Injurious Mites and their Control

0482

28200 AGUDELO-SILVA, F. 1986. A species of Triplosporium (Zygomycetes: Entomophthorales) infecting Mononychelus progressivus (Acari: Tetranychidae) in Venezuela. Florida Entomologist 69(2):444-446. En., 3 Ref., Il. [Biosis, 1057 East Meadow Circle, Palo Alto, CA 94303, USA]

Cassava. Mononychellus progressivus. Mite control. Biological control. Venezuela.

The identification of a fungus causing the death of Mononychellus progressivus mites attacking cassava in Venezuela is reported. Based on the characteristics of fungal structures as observed using a phase contrast microscope, the fungus was identified as belonging to the genus Triplosporium, and most likely to the species T. floridanum. (CIAT)

0483

28136 COBB, F.I., ed. 1987. Predators for plenty. Protecting crops through biological control. Development International 1(2):38-39. En., Il.

Cassava. Predators and parasites. Biological control. Mononychellus tanajoa. Latin America. Africa. Asia.

The benefits of biological control as a component of an integrated pest management program are outlined. The technique can be applied usefully in developing countries under 2 conditions: (1) when the value of the crop is low relative to the cost of pesticides or other control measures (e.g., cassava in Africa) and (2) when the overuse of pesticides has rendered them ineffective. Biological control of insects works best if the pest has a moderate-to-low reproductive rate, is nonmigratory, and is "indirect" (damages a part of the crop other than that harvested); likewise, the cropping system should be stable. The introduction of a wasp to Africa from Latin America to control the cassava mealybug is given as an example, indicating that there is no danger in introducing parasites and predators from elsewhere if the procedure explained is followed. (CIAT)

0484

28514 EMEHUTE, J.K.U.; EZULIKE, T.O. 1982. Trend in field presence and alternative host systems of cassava green spider mite at National Root Crops Research Institute, Umudike, Imo State, Nigeria. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute, National Cassava Centre. pp.118-122. En., Sum. En., 3 Ref.

Cassava. Mononychellus tanajoa. Pest control. Cultivars. Manihot dichotoma. Manihot glaziovii. Nigeria.

The presence of Mononychellus tanajoa in the field was studied over 15 mo. by taking samples of the 1st 6 leaves below the terminal bud of cassava plants at 4 locations in Imo State, Nigeria. Inspections of different plant species helped identify alternative hosts. M. tanajoa was 1st observed at

Umudike during the 1980 dry season. Peak infestations were found to occur between Jan.-April, low levels being reported between July-Sept. Rainfall was important for M. tanajoa incidence not so ambient temp. Manihot glaziovii and M. dichotoma are alternative hosts, showing greater tolerance than cassava. The best and safest method of control is to use tolerant or resistant cassava var. in early plantings. (CIAT)

0485

28183 ENYINNIA, T. 1984. The green spider mite of cassava and its control. Umudike, Nigeria, National Root Crops Research Institute. Agricultural Extension Research, Liaison and Training. Extension Bulletin no.12. 6p. En., 6 Ref., Il.

Cassava. Mononychellus tanajoa. Fertilizers. Symptomatology. Cultivars. Pest damage. Weeding. Adaptation. Insect biology. Planting. Timing. Mite control. Nigeria.

Basic information on the cassava green spider mite and available control methods is presented. A brief description is given of the pest and its symptoms, distribution in Nigeria, biology, survival, and spread are indicated. Suggested control methods include early planting, selected var. such as TMS 4(2)1425, TMS 60142, U/41044, TMS 30555, and TMS 30572, and adequate soil fertilization (NPK and Mg). (CIAT)

0486

28512 EZULIKE, T.O.; EMEHUTE, J.K.U.; ATU, U.G. 1982. Cassava mites in Nigeria. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.104-110. En., Sum. En., 12 Ref.

Cassava. Mononychellus tanajoa. Mite control. Biological control. Oligonychus gossypii. Insecticides. Nigeria.

A brief review is presented of the geographical distribution, damage symptoms, economic damage, biological cycle, spread, and control of Mononychellus tanajoa and Oligonychus gossypii in Nigeria. Control measures discussed are cultural control (early planting at the onset of rains), host plant resistance, biological control (Artlyseius fustis, Oligota minuta, Typhlodromus limonicus, T. rapax, Strethorus sp.), and chemical control (treating planting materials with pesticides). (CIAT)

0487

28587 LEMA, K.M. 1986. Further studies on green mite resistance in cassava. IITA Research Briefs 7(1):7. En.

Cassava. Mononychellus tanajoa. Mononychellus progressivus. Cultivars. Resistance. Clones. Pest damage. Nigeria.

Ten cassava clones were planted at the International Institute of Tropical Agriculture (Ibadan, Nigeria) for screening and Mononychellus tanajoa/M. progressivus population dynamics studies. The 1st results indicated that TMS 91934, a pubescent and high yielding clone, consistently showed the lowest damage score, while in some fields mite populations were as high as in most clones. A significant correlation ($r = -0.59$) was found between pubescence and damage score, while the correlation between pubescence and mite population levels was not significant ($r = -0.50$). (CIAT)

0488

28540 MESA C., N.C. 1986. Reconocimiento taxonómico de ácaros de la familia Phytoseiidae, estudio biológico y comportamiento de las principales

especies presentes en el cultivo de la yuca Manihot esculenta Crantz, en el Departamento del Valle. (Taxonomic identification of Phytoseiidae mites, biological study, and behavior of the main species found on cassava crops in the Valle del Cauca). Tesis Mag. Sistemática. Bogotá, Universidad Nacional de Colombia. Instituto de Ciencias Naturales. 325p. Es., Sum. Es., En., 178 Ref., Il.

Cassava. Insect biology. Mite control. Amblyseius aerialis. Amblyseius chiapensis. Amblyseius herbicolus. Amblyseius largoensis. Euseius alatus. Euseius concordis. Euseius raindaimei. Euseius sibelius. Galendromus annectens. Galendromus helveolus. Iphiseiodus zuluagai. Neoseiulus anonymus. Neoseiulus chilerensis. Proprioseiopsis cannaensis. Typhlodromalus aripo. Typhlodromalus limonicus. Typhlodromalus peregrinus. Typhlodromina subtropica. Typhlodromina tropica. Typhlodromips neotunus. Monorychellus tanajoa. Tetranychus urticae. Biological control. Colombia.

A taxonomic inventory and morphological description were made of Phytoseiidae species, one of the most important groups of predators of phytophagous mites in various crops, including cassava, to determine which species are present in cassava crops in Valle del Cauca (Colombia), their geographic distribution, and associations with tetranychid mites. Basic material was obtained in visits to the major cassava areas in the Valle. Species collected were identified using artificial keys and verified by Dr. Gilberto J. Moraes (U. of California-Riverside, USA). The presence and distribution of 21 species of Phytoseiidae were determined namely, Amblyseius aerialis, A. chiapensis, A. herbicolus, A. largoensis, Euseius alatus, E. concordis, E. raindaimei, E. sibelius, Galendromus annectens, G. helveolus, Iphiseiodus zuluagai, Neoseiulus anonymus, N. chilerensis, Proprioseiopsis cannaensis, Typhlodromalus aripo, T. limonicus, T. peregrinus, Typhlodromina subtropica, T. tropica, and Typhlodromips neotunus. Of these, 5 are new reports for Colombia and 12 were observed for the 1st time on cassava in this country. T. limonicus was found in all localities, associated mainly with Monorychellus tanajoa; N. anonymus was found associated mainly with M. tanajoa and Tetranychus urticae, and G. helveolus in association with T. urticae and M. tanajoa. T. limonicus and N. anonymus are the 2 most widely distributed species of Phytoseiids. Therefore, life cycle and feeding habit studies were conducted in growth chambers with controlled temp. and RH at CIAT-Palmira. Observations on the biology, oviposition, and longevity of N. anonymus were made at 20, 23, 25, and 30 degrees Celsius and 70-75 percent RH. At these temp. the total development period from egg to adult was 8.84, 6.11, 4.75, and 3.98 days, resp. The egg, larva, protonymph, and deutonymph stages required 2.95, 5.80, 14.80, and 24.27 degree-days, resp., to be completed. The mean no. of eggs/female/day when preying on T. urticae at the above-mentioned temp. was, resp., 1.40, 2.38, 2.82, and 2.70. The effect of the prey species M. tanajoa and T. urticae on the oviposition rate was determined at 25 degrees Celsius. The mean no. of eggs/female/day was 1.44 and longevity 10.12 days for N. anonymus females feeding on M. tanajoa and 2.82 and 19.12 days, resp., when feeding on T. urticae. N. anonymus larvae do not feed. The nymphal stages can develop completely preying on either prey. Predators preferred the egg stage of both prey species for feeding. Ovipositing females had the largest consumption; daily intakes of M. tanajoa and T. urticae were, resp., 1.59 and 6.50 eggs, 0.80 and 0.67 larvae and nymphs, and 0.68 and 0.39 adults. Observations on the biology of T. limonicus were made at 15, 20, 23, and 25 degrees Celsius and 70-75 percent RH. At these temp. total developmental time from egg to adult were 14.5, 6.7, 6.7, and 4.6 days, resp. The mean no. of eggs/female/day was 1.05, 1.17, 2.11, and 1.57 at the above-mentioned temp. All immature stages of the predator were observed to feed, preferring prey egg and larvae. During oviposition females had the highest consumption; adult stages were preferred. (AS (extract))

0489

28876 NDAYIRAGIJE, P.; NKUBAYE, E. 1986. Programme de recherches sur l'acariose (Mononychellus tanajoa) du manioc. (Research program on cassava green mite (Mononychellus tanajoa)). In Institut des Sciences Agronomiques du Burundi. Rapport Annuel 1986. (Septembre 1985-Aout 1986). Bujumbura, v.3, pp.176-193. Fr., Tl.

Cassava. Mononychellus tanajoa. Cultivars. Predators and parasites. Productivity. Resistance. Adaptation. Burundi.

Results are presented of various trials conducted by the research program on the cassava green mite, initiated by the Institut des Sciences Agronomiques du Burundi in mid-Nov. 1983. The trials deal with the evaluation of losses in Imbo (low alt.), Moso (intermediate alt.), and Citega (high alt.); evaluation of var. performance in a cassava collection in Imbo; and the inventory of local predators of the green mite and of the 1st releases of exotic predators in this country. In Imbo, var. Mpambayabashengara registered the lowest yield loss, followed by Criolinha and Nakarasi, and in Moso, the latter var. showed the best performance. Results of the Citega trial were not significant due to unfavorable conditions. Cassava var. of the International Institute of Tropical Agriculture (Nigeria) were susceptible to the green mite; however, they yield higher than the local var. Var. Yongwe I gave the highest yields, presenting a coefficient of attack of 3; TMS 4(2)0347DB, with a coefficient of 5, produced more than 5 kg/plant, while var. with coefficients of 0-2 yielded less than 5 kg/plant. Finally, various predator species of the green mite were identified and observations continue on the performance of Amblyseius idaeus in relation to the control of this pest. (CIAT)

0490

27618 NDAYIRAGIJE, P. 1985. L'acariose (Mononychellus tanajoa) du manioc. (Green cassava mite (Mononychellus tanajoa)). In Institut des Sciences Agronomiques du Burundi. Rapport des Recherches Agronomiques 1985. Bujumbura, Burundi. pp.125-128. Fr., Il.

Cassava. Mononychellus tanajoa. Cultivars. Timing. Productivity. Planting. Tetranychus. Oligonychus. Amblyseius fustis. Iphiseius degenerans. Oligota. Stethorus. Neoseiulus anonymus. Adaptation. Predators and parasites. Climatic requirements. Burundi.

The methodology used and the results of trials carried out in Burundi in 1985 on the green cassava mite (Mononychellus tanajoa) are presented. In the screening trial for var. tolerant to this mite, the most outstanding were Mugaraganza, TMS 4C160/DB, Billan, a local var., Zayneti, Mutakorora, and Kabumbekigoma. In the trial evaluating the incidence of the mite on production and the effect of planting date on cassava var. Nakarasi and Criolinha, av. yield reduction was found to be much greater as the planting date was delayed; on the other hand, plots planted in Feb., receiving 250.5 mm of rainfall, yielded better than those planted in April, receiving only 44 mm of rainfall during the 1st 3 mo. The production of the latter crops decreased by 42-49 percent in relation to those planted in Feb. Finally, monitoring studies confirmed that M. tanajoa is the predominant mite in cassava; less important mites are Tetranychus sp. and Oligonychus sp. Two Phytoseiidae predator mites (Amblyseius fustis and Iphiseius degenerans) were identified and 2 predator coleoptera (Oligota sp. and Stethorus sp.) were observed. Two other exotic Phytoseiidae (A. idaeus and Neoseiulus anonymus) were introduced to improve the natural regulation of populations. (CIAT)

0491

28104 NDAYIRAGIJE, P. 1984. Programme de recherches sur l'acariose (Mononychellus tanajoa) du manioc. (Research program on the green cassava mite (Mononychellus tanajoa)). In Institut des Sciences Agronomiques du Burundi. Rapport Annuel 1984. Bujumbura, Burundi. v.1, pp.107-108. Fr.

Cassava. Mononychellus tanajoa. Timing. Harvesting. Mite control. Cultivars. Planting. Burundi.

The main objectives of the research program on the green cassava mite of the Institut des Sciences Agronomiques du Burundi during 1984 are presented. The methodology and preliminary results of an evaluation trial on the incidence of green mites on harvest, in relation to planting times of cassava var. Nakarasi (short cycle) and Criolinha (long cycle), are included. (CIAT)

0492

28126 PILLAI, K.S.; PALANISWAMY, M.S. 1985. Spider mites of cassava. Kerala, India, Central Tuber Crops Research Institute. Technical Bulletin Series no.1. 20p. En., 9 Ref., Il.

Cassava. Tetranychus cinnabarinus. Tetranychus neocaledonichus. Eutetranychus orientalis. Oligonychus biharensis. Insect biology. Plant injuries. Mite control. Resistance. Predators and parasites. Ecology. Productivity. Insecticides. Yields. Costs. Income. Germplasm. India.

Research carried out at the Central Tuber Crops Research Institute (India) is summarized regarding the biology and bionomics, distribution, extent of damage, and control measures, including host plant resistance to the spider mite complex (Tetranychus cinnabarinus, Eutetranychus orientalis, Oligonychus biharensis, and T. neocaledonichus) attacking cassava in this country. The biology and bionomics of T. cinnabarinus and E. orientalis are described in detail. Predators recently recorded on the cassava mite complex include Pharoscymnus hornii, Stethorus gilvifrons, Oligotta sp., Amblyseius longispinosus, and Scolothrips indicus. A list of effective alternate host plants of mites in India is included. A study on the ecology and population build up of the mite complex over a 5-yr period (1977-82) indicated that rainfall is the major factor limiting mite populations. In trials assessing yield loss, these were found to range from 17 to 23 percent in crops planted in July and harvested in April, and from 20 to 33 percent in Nov. plantings. The insecticides monocrotophos, dimethoate, methyl demeton, phosphalone, tafethion, and dicofol as 0.05 percent sprays were highly effective in controlling mite populations; only sprays with emulsifiable concentrates were effective whereas wettable powders and granular formulations were not. Water sprays were also found to help control the pests. Monocrotophos, dimethoate, and methyl demeton did not produce any resurgence problem of the pest by their repeated application. The max. cassava yield (31.4 t/ha) was recorded in the treatment with methyl demeton, followed by the treatments with dimethoate (31.2 t/ha) and monocrotophos (29.6 t/ha). Results of another trial indicated that spraying water at 10-day intervals was almost as effective as spraying dimethoate at 30-day intervals; however, the cost:benefit ratio was higher in the pesticide treatment (1:3.4) than in the water treatment (1:2.6) since the latter treatment required more labor. The economic threshold level of damage by the mite complex was estimated to be 10 percent for H-2304 and H-4 and 25 percent for H-1687. The relationship between HCN content and mite population could not be correlated. Of a total of 57 accessions of the available germplasm collections, 66 percent of the entries were highly susceptible and approx. 30 percent were susceptible; only 2-3 percent of the entries were considered resistant. The exotic accessions with a high degree of field resistance were CE-4, CE-14, CE-38, and CE-139. (CIAT)

0493

28557 RAROS, L.C. 1985. Survey, identification and biology of natural enemies of spider mites attacking cassava and sweet potato. Terminal report. Los Baños, Laguna, Philippine Council for Agriculture and Resources Research and Development. Study no.1. Project no.0900-80-00.31. 148p. En., Sum. En., 78 Ref., Il.

Cassava. Injurious mites. Predators and parasites. Field experiments. Laboratory experiments. Insect biology. Mite control. Stethorus. Amblyseius longispinosus. Philippines.

Field studies were made on the population dynamics of the cassava spider mite and sweet potato flat mite and their predators within the expt. station of Visayas State College of Agriculture in Baybay (Leyte, Philippines). On cassava, Stethorus sp., Amblyseius longispinosus, and staphylinid beetles were most frequent and abundant, while cecidomyiid maggots and predatory thrips were found only sporadically. Spider mite abundance was governed by rainfall, with peak densities recorded during the dry months. They more frequently infested and were 3 times as dense on lower as on upper leaves of cassava plants. The predators responded numerically, both to the temporal and vertical distribution of their prey. Lab. studies of Stethorus reared on its normal prey indicate a developmental period of about 2 wk., adult longevity of 3 wk., and total egg production of 42/female; however, when reared on sweet potato spider mites (Tetranychus marianae) development was slightly lengthened and adult longevity greatly reduced. The beetle exhibited a "killer instinct" and pronounced cannibalistic tendencies. It also attacked the eggs of all other predators and the active stages of the phytoseiid. Daily consumption of starved females was 162 eggs or 18 female prey mites, and for unstarved ones, 90 eggs or 19 mites. It readily fed on other spider mites, accepted pollen and flower juices of some plants, but accepted eggs and larvae of some sucking insects only when starved. Life history studies of A. longispinosus show a very short developmental period of 4.6 days, of which incubation occupied the longest. The larva was very short-lived and nonfeeding. The 2 nymphal stages and adults fed on all stages of the prey. The female consumed an av. of 12.7 eggs or 2.7 female mites/day. It appeared to be strictly carnivorous but did not accept the large sucking insects as food. Based on its field persistence, low food requirements and agility in searching out prey, A. longispinosus is expected to play a significant role in keeping spider mite populations in check before the latter attains densities of pest proportions; however, the activities of the larger insect predators, especially Stethorus, are necessary to bring down pest situations during the dry months. (AS)

0494

28153 SCHICHA, E.; GUTIERREZ, J. 1985. Phytoseiidae of Papua New Guinea, with three new species, and new records of Tetranychidae (Acari). International Journal of Acarology 11(3):173-181. En., Sum. En., 41 Ref., Il. [Biological & Chemical Research Inst., Dept. of Agriculture, New South Wales, Rydalmere, N.S.W. 2116, Australia]

Cassava. Tetranychus kanzawai. Tetranychus lambi. Tetranychus neocaledonicus. Tetranychus piercei. Tetranychus fijiensis. Panonychus citri. Tetranychus marianae. Typhlodromus dominiquae. Amblyseius armellae. Amblyseius anmae. Amblyseius ovaloides. Papua New Guinea.

The female of Typhlodromus dominiquae n.sp., the female of Amblyseius armellae n.sp., the female and male of A. anmae n.sp., and the male of A. ovaloides are described and illustrated. Collection records are given for these species and for 8 additional species from Papua New Guinea, including A. largoensis, A. longispinosus, and A. tamatavensis from cassava. Twelve

Tetranychoidea were collected in association with these Phytoseiidae; among the 10 reported for the 1st time in New Guinea are Oligonychus biharensis and Tetranychus kanzawai in cassava. (AS (extract)) See also 0411 0427 0464 0469 0470 0475 0549 0567 0583

G00 GENETICS AND PLANT BREEDING

0495

28592 BIGGS, B.J.; SMITH, M.K.; SCOTT, K.J. 1986. The use of embryo culture for the recovery of plants from cassava (Manihot esculenta Crantz) seeds. Plant Cell Tissue and Organ Culture 6(3):229-234. En., Sum. En., 8 Ref., Il. [Dept. of Biochemistry, Univ. of Queensland, St. Lucia, Qld. 4067, Australia]

Cassava. Tissue culture. Morphogenesis. Seed. Propagation materials. Plant breeding. Germination. Australia.

An embryo culture method is described whereby embryonic axes are excised from mature seeds of cultivated cassava and placed on a culture medium containing 1.23 micromolar IBA at 30 degrees Celsius under continuous light. The no. of plants recovered by embryo culture was much greater than the no. recovered from conventional seed germination procedures. (AS)

0496

29494 KAWANO, K.; FUKUDA, W.M.G.; CENPUKDEE, U. 1987. Genetic and environmental effects on dry matter content of cassava root. Crop Science 27(1):69-74. En., Sum. En., 22 Ref., Il.

Cassava. Dry matter. Roots. Genetics. Cytogenetics. Plant breeding. Clones. Inheritance. Selection. Timing. Developmental stages. Adaptation. Colombia.

Genetic and environmental variabilities of root DM content of cassava clones (accessions and breeding lines) were estimated at different harvest mo. (8 or 12 mo.), seasons (wet and dry), and locations (3 alt.). To assess the possibility of obtaining higher DM yield through selection for root DM content, genetic studies based on F1 variability and parents-offspring regressions also were conducted. Age of plant, season, and location significantly affected root DM content. Temp. appeared to be an important factor related to the effect of location. The highest root DM content was obtained with 8-mo.-old plants harvested at the beginning of the dry season in the high alt. location, while the lowest occurred with 12-mo.-old plants harvested at the beginning of the wet season at the low alt. location. The clone effect was highly significant and a broad-sense heritability of 0.87 was obtained. Clone x location interaction was also significant, but the magnitude of this effect was much smaller than that of the clone effect. Genetic analyses suggested that inheritance of root DM content was controlled mainly by polygenic additive factors. Narrow-sense heritabilities ranging from 0.51 to 0.67 were obtained. There was no indication of negative response in root DM content after intensive mass selection for root fresh yield. The data indicate that root DM content can be increased by simple breeding techniques such as phenotypic mass selection. Selection of clones at 1 location was largely valid for other locations; however, final selection should be made at each specific location for max. potential gain. (CIAT)

0497

27657 NASSAR, N.M.A. 1986. Genetic variation of wild Manihot species native to Brazil and its potential for cassava improvement. Field Crops Research

13:177-184. En., Sum. En., 18 Ref. [Depto. de Agronomía, Univ. de Brasilia, 70.919 Brasilia, Brasil]

Cassava. Cytogenetics. Plant breeding. Manihot tripartita. Manihot anomala. Manihot zehntneri. Manihot oligantha subsp. nestili. Manihot gracilis. HCN content. Plant growth. Ecosystems. Hybridization. Manihot caerulescens. Manihot stipularis. Manihot procumbens. Manihot reptans. Manihot pruinosa. Manihot paviaefolia. Manihot falcata. Manihot alutacea. Manihot pentaphylla. Fiber content. Protein content. Soil fertility. Rainfall data. Ecology. Root development. Brazil.

Wild Manihot species native to Brazil were collected from different localities and studied for economic characters and nature of their wild habitats. Screening for protein and HCN contents showed that 2 of them, M. oligantha and M. gracilis, have a notably high percentage of protein combined with a low percentage of HCN. The study of natural habitats revealed a certain genetic potential in the material. It has been possible to detect, among other characteristics, resistance to drought and excessive soil Al toxicity, and adaptation to cool temp. (AS)

0498

28559 NASSAR, N.M.A.; SILVA, J.R. DA; VIEIRA, C. 1986. Hibridacao interespecifica entre mandioca e espécies silvestres de Manihot. (Interspecific hybridization between cassava and wild Manihot species). Ciencia e Cultura 38(6):1050-1055 Pt., Sum. Pt., En., 15 Ref., Il.

Cassava. Hybridizing. Hybrids. Cytogenetics. Plant breeding. Manihot glaziovii. Manihot pseudoglaziovii. Manihot caerulescens. Manihot pohlii. Brazil.

Hybridization of the 4 wild Manihot species (M. glaziovii, M. pseudoglaziovii, M. caerulescens, and M. pohlii) with cassava (M. esculenta) showed incompatibility of the 1st 3 species and a limited compatibility with M. pohlii. Phylogenetic relationships between the species are discussed. The most favorable time of pollination under Central Brazil conditions was found to be Feb. and April. A cytological study indicated a haploid no. of 18 for all 4 species. The chromosome no. of M. pseudoglaziovii and M. pohlii is reported for the 1st time. (AS)

0499

28593 SMITH, M.K.; BIGGS, B.J.; SCOTT, K.J. 1986. In vitro propagation of cassava (Manihot esculenta Crantz). Plant Cell Tissue and Organ Culture 6(3):221-228. En., Sum. En., 7 Ref., Il. [Redlands Horticultural Research Station, P.O. Box 327, Cleveland, Qld. 4163, Australia]

Cassava. Propagation. Plant reproduction. Tissue culture. Plant development. Growth. Germplasm. Australia.

A method is presented for the rapid in vitro propagation of cassava. Nodal explants were induced to grow as multiple-shoot cultures on a medium containing 1.0 micromolar BAP, supplemented with 0.25 micromolar NAA. Nodes were removed from the shoots after 3 wk. of growth and subcultured on fresh culture medium. An av. of 7.0 nodes were produced from each explanted node after 3 wk. in culture. Nodal explants were transferred to a medium containing 2.5 micromolar IBA to improve root initiation on the developing plantlets. Plant establishment was possible upon transfer to soil. In vitro propagation offers enhanced rates of multiplication over more conventional methods of propagation. In addition, in vitro propagation facilitates the storage and international exchange of cassava germplasm. (AS) See also 0395 0402

G01 Breeding, Germplasm, Varieties and Clones, Selection

0500

28585 CONNOLLY, M. 1986. Improved varieties of cassava and sweet potatoes for Sudan and Malawi. IITA Research Briefs 7(1):1,4. En., Il.

Cassava. Cultivars. Adaptation. Clones. Cassava African mosaic virus. Sudan. Nigeria. Kenya. Uganda.

The results of cassava var. trials conducted in Sudan are briefly reported. Cassava clones from Nigeria, Kenya, and Uganda were tested, including 4 var. from the International Institute of Tropical Agriculture (IITA) and the local control Oreste. IITA var. TMS 30555 performed best with a projected yield of 69 t/ha; it also had the highest score for taste and good resistance to CAMD. This var. has therefore been released (on a preliminary basis) for rapid multiplication and distribution to farmers. (CIAT)

0501

28364 HEYS, G. 1980. Selection of improved cassava clones. In NAFPP National Cassava Workshop, 4th., Umudike, Nigeria, 1980. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.181-184. En.

Cassava. Clones. Productivity. Plant development. Cultivars. Adaptation. Nigeria.

Results of large-scale cassava clone trials conducted by International Institute of Tropical Agriculture (Nigeria) to identify promising high yielding materials are presented. The highest yielding clones at 4 locations were 30555 (40.8 t/ha) and 30572 (36.0 t/ha). Yield estimates for 6 promising clones are given for 4 sites (IITA, Mokwa, Onne, and Warri). (CIAT)

0502

27676 INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES. 1985. Root and tuber crops: cassava. In _____. Annual Report 1984. Rome, Italy. pp.13-14. En.

Cassava. Germplasm. Tissue culture. Genetics. Research. Italy.

The activities carried out on cassava at the International Board for Plant Genetic Resources during 1984 are summarized. The Board supported other international or national research centers, including CIAT, in collecting Manihot spp. germplasm and developing tissue culture-related technology. (CIAT)

0503

28110 TERNES, M.; MONDARDO, E.; MIURA, L.; SANTOS JUNIOR, O.G.; SCHMITT, A.T. 1984. Mandioca. (Cassava). In Empresa Catarinense de Pesquisa Agropecuaria. Recomendacao de cultivares para o Estado de Santa Catarina 1984-1985. Florianópolis-SC, Brasil. Boletim Técnico no.23. pp.42-45. Pt., Il. [Empresa Catarinense de Pesquisa Agropecuaria, Estacao Experimental de Itajaí, Caixa Postal 277, Itajaí-SC, Brasil]

Cassava. Cultivars. Agronomic characters. Root productivity. Starch productivity. HCN content. Cassava bacterial blight. Resistance. Brazil.

The cassava cv. recommended for different regions of the state of Santa Catarina, Brazil, are presented in tables that include additional information on root and starch yields, root pulp color, stem color, plant

height, resistance to CBB, and HCN status. Cv. Mico, Mandim Branca, Aipim Gigante, and EMPASC 251-Machado are recommended for the Vale do Itajaí, the northern coast, and Florianópolis; Mandim Branca and Aipim Gigante are recommended for 1-cycle crops in the Santa Catarina coastal region, and the latter 2 as well as Mico, Vassourinha, and Maroon are recommended for 2-cycle crops for both southern and coastal Santa Catarina; cv. Fitinha is also recommended for southern Santa Catarina. (CIAT) See also 0398 0401 0424 0427 0431 0433 0438 0447 0448 0457 0458 0460 0465 0479 0485 0487 0489 0490 0491 0540 0542 0549 0550 0557 0561 0562 0567 0568 0583 0584 0586 0587 0589 0590 0591 0593 0597 0601 0602 0603 0604 0608 0609 0610 0614 0626 0630

H00 NUTRITION

See 0423 0538

H01 Cassava Foods and Nutritive Value

0504

28198 MORALES, E.; GRAHAM, G.G. 1987. Digestibility of boiled and oven-dried cassava in infants and small children. Journal of Nutrition 117(1):129-132. En., Sum. En., 11 Ref. [Inst. de Investigación Nutricional, Apartado 55, Miraflores, Lima, Perú]

Cassava. Human nutrition. Nutritive value. Diets. Dietary value. Kwashiorkor. HCN. HCN content. Digestibility. Peru.

Boiled fresh cassava from the coastal valleys of Peru or oven-dried CF provided 50 percent of the energy and less than 10 percent of the protein in diets of convalescent malnourished infants; casein was added to complete 8 percent of energy as protein, and vegetable oil (soybean-cottonseed) was added to make 20 percent of energy as fat. Despite high wet wt. of feces (172 plus or minus 42 and 214 plus or minus 41 g/day), their dry wt. (20 plus or minus 3 and 22 plus or minus 2 g/day) and their energy (6.9 plus or minus 0.7 and 7.6 plus or minus 0.5 percent of intake) and N (17 plus or minus 3 and 20 plus or minus 3 percent of intake) contents were low, and their fat content (4.4 plus or minus 1.3 and 5.2 plus or minus 1.2 percent of intake) was very low. Cassava is a surprisingly effective source of energy which interferes little or not at all with digestion of added protein and fat in weaning diets. For its safe use, it is important that home or industrial processing almost completely eliminate its potential HCN content, and that a good quality protein supplement be consumed regularly in nutritionally adequate amounts. (AS)

0505

28187 OJI, M.A. 1983. Recipe development and utilization of root crops products. Umudike, Umuahia, Nigeria, National Root Crops Research Institute. Agricultural Extension Research Liaison and Training. Extension Bulletin no.3. 37p. En., 4 Ref.

Cassava. Human nutrition. Cassava flour. Foofoo. Fermented products. Gari. Diets. Food products. Nigeria.

Recipes using root crop products are presented. For cassava, the recipes of Akara balls, CF cookies, CF lemon cake, tapioca salads, fermented cassava fufu, and gari fufu are detailed. (CIAT)

0506

28594 OKEKE, E.C.; OBIZOBA, I.C. 1986. The nutritive value of all-vegetable protein diets based on legume, cereal and tuber in weanling rats. Qualitas Plantarum Plant Foods for Human Nutrition 36(3):213-222. En., Sum. En., 7 Ref. [Dept. of Home Science & Nutrition, Univ. of Nigeria, Nsukka, Nigeria]

Cassava. Feeds and feeding. Animal health. Diets. Laboratory animals. Nutritive value. Animal physiology. Nigeria.

Thirty albino weanling male rats (45-55 g) were divided into 5 groups of 6 rats each on the basis of body wt. and fed combinations of dehulled brown beans, parboiled rice, and CM providing 10 percent protein for 35 days. Casein served as the reference protein. Combinations of dehulled brown beans (50-80 percent) with rice (18-48 percent) and CM (2 percent) produced varied effects on body wt., N intake, N digestibility and retention, BV, liver wt., and plasma albumin (P less than 0.05). The dehulled brown beans:rice:CM (70:28:2) blend induced decreases in all the parameters tested, except for the BV and PER values. The control group produced digested and retained N, PER, wt. gain, and liver wt. that were significantly higher than for those of the test diets (P less than 0.05). These results appear to suggest that starchy foods when blended with legumes at low levels produced good quality protein comparable with casein. (AS)

0507

29031 RAVINDRAN, V.; RAJADEVAN, P.; GOONEWARDENE, L.A.; RAJAGURU, A.S.B. 1986. Effects of feeding cassava leaf meal on the growth of rabbits. Agricultural Wastes 17(3):217-224. En., Sum. En., 17 Ref. [Dept. of Animal Science, Univ. of Peradeniya, Peradeniya, Sri Lanka]

Cassava. Cassava leaf meal. Animal health. Diets. Methionine. Amino acids. Technology transfer. Cassava programs. Sri Lanka.

CLM, prepared from leaves remaining after the harvest of cassava roots, contained CP 20.1 percent, acid detergent fiber 30.3 percent, P 0.39 and Ca 1.16 percent DM, gross energy 4.6 Mcal/kg, and 84, 622, 9, 178, and 223 mg/kg of HCN, Fe, Cu, Mn, and Zn, resp. CLM was a rich source of essential amino acids except met. In 2 trials, New Zealand White crossbred rabbits (av. body wt. 545 g) were given a diet based on maize, rice polishings, and coconut oilcake (25, 25, and 40 percent), without or with CLM added to replace 50 or 100 percent of the coconut oilcake. The results suggest that CLM could be used up to the 40 percent level in growing rabbit diets without any adverse effects on growth performance or carcass characteristics. CLM could be a cheaper alternative for coconut oilcake, especially in tropical areas where sun drying of cassava leaves is feasible. (AS)

0508

28106 SPEAR, P.T.; RODEL, M.G.W. 1982. Substitution of maize by cassava in high-energy diets for fattening steers. In Zimbabwe. Department of Research and Specialist Services. Division of Livestock and Pastures. Annual Report 1981-1982. Zimbabwe. pp.83-85. En.

Cassava. Cassava meal. Animal nutrition. Dietary value. Diets. Feeds and feeding. Economics. Zimbabwe.

High-energy, maize-based diets in which CM was substituted for maize at levels of 33, 67, and 100 percent were fed to fattening steers during an 83-day period. In terms of body mass, diets with 33 and 67 percent CM resulted in slightly greater gains (144.6 and 144.1 kg, resp.) compared

with the standard high-energy diet (142.2 kg), the diet with 100 percent CM being slightly less (133.3 kg). Carcass gains were, however, lower at all substitution levels (94.1, 90.8, and 79.9 kg, resp.) compared with the standard diet (94.9 kg). The economics of substituting cassava for maize in finishing rations will depend on the relative costs of both feeds but 33 percent CM could be substituted for maize without losses in animal performance. (CIAT) See also 0509 0511 0514 0515 0518 0520 0522 0532

H02 Nutritive Disorders in Humans

0509

28560 ONYEZILI, N.I.; EJEZIE, G.C.; ENWONWU, C.O. 1986. Inadequacy of plasma thyroxine-binding prealbumin as index of protein malnutrition. Nutrition Reports International 34(2):165-173. En., Sum. En., 30 Ref. [National Inst. for Medical Research, P.M.B. 2013, Edmond Crescent, Yaba, Nigeria]

Cassava. Human health. Malnutrition. Diets. Kwashiorkor. Nigeria.

Plasma prealbumin and various anthropometric parameters were measured in 127 impoverished Nigerian children aged 4-36 mo. The children were fed the same types of diets before and during the studies. These diets consisted mostly of a maize-based food highly limiting in tryptophan, starchy roots such as cassava and yam, and plantain. Group A children were dewormed and treated with antimalarials. Group B received no prior medical attention while Group C consisted of 19 children with clinical evidence of marasmic-kwashiorkor. Plasma prealbumin was highest in Group A but failed to distinguish between Groups B and C. Only arm circumference discriminated between Groups B and C. The apparently "normal", mildly, and moderately malnourished children within Group B did not differ in prealbumin levels. The data suggested that prealbumin level was susceptible to infections, and also correlated poorly with the various stages of protein-energy malnutrition. (CIAT) See also 0516

H03 Animal Feeding

0510

27685 ALMANZAR, L.J. 1984. Procesamiento de las raíces de yuca para alimentación animal. (Cassava root processing for animal feeding). Agro (República Dominicana) 13(115):10-11. Es., 1 Ref., Il.

Cassava. Cassava roots (vegetable). Animal nutrition. Drying. Substitutes. Supplements. Latin America.

Considerations on the growing demand for dry cassava for the animal feed industry in Latin America are discussed, with a brief description of the available cassava drying methods (continuous artificial drying in rotary or conveyor dryers, batch drying in static bed dryers using forced air, and natural drying on concrete floors or trays). This latter method is described in more detail because of its low cost and easy application. It is recommended to create the bases among processing plant owners to prepare cassava-based balanced feeds as a substitute for maize and sorghum and to build a cassava drying pilot plant in a cassava growing region with farmer participation in the drying process. (CIAT)

0511

28165 FARINU, G.O.; FETUGA, B.L. 1986. Organ growth in two breeds of pigs fed diets varying in protein and energy levels. Nutrition Reports International 34(1):109-117. En., Sum. En., 17 Ref., Il. [Biochemistry Dept., Univ. of Ilorin, Ilorin, Nigeria]

Cassava. Diets. Animal health. Feeds and feeding. Swine. Cassava flour. Nutritive value. Dietary value. Nigeria.

Large White x Landrace and Nigerian indigenous pigs were given a 24 percent CP weaning diet until av. body wt. were 9.33 and 6.05 kg, resp. Three different diets were then given for 84 days: (1) a control diet consisting of maize meal 55.0 percent and soybean oilmeal 31.2 percent; (2) a low-protein, low-energy diet consisting of maize meal 10.00 percent, soybean oilmeal 6.24 percent, cellulose 35.12 percent, and CF 42.84 percent; or (3) a low-protein, high-energy diet consisting of maize meal 10.00 percent, soybean oilmeal 6.24 percent, cellulose 8.00 percent, and CF 63.96 percent. Control pigs of both breeds gained significantly more wt. than those given diets 2 or 3. Large White x Landrace pigs on diets 2 and 3 showed gross changes in appearance of skin and hair and Nigerian indigenous pigs had smaller body size and rougher skin and hair. The diet and breed significantly affected mean organ and gland wt. Results indicate that the Nigerian indigenous pig could be a suitable model for protein-calorie deficiency studies, especially using the kidney, spleen, liver, and pancreas as marker organs. (CIAT)

0512

29022 FRAKES, R.A.; SHARMA, R.P.; WILLHITE, C.C.; GOMEZ, G. 1986. Effect of cyanogenic glycosides and protein content in cassava diets on hamster prenatal development. Fundamental and Applied Toxicology 7(2):191-198. En., Sum. En., 28 Ref., Il. [Toxicology Program, UMC56, Utah State Univ., Logan, UT 84322, USA]

Cassava. Animal nutrition. Human nutrition. Cassava meal. HCN. HCN content. Feed constituents. Dietary value. Cyanogenic glycosides. Protein content. Diets. USA.

Groups of pregnant hamsters were fed diets consisting of CM:lab. chow (80:20) during days 3-14 of gestation. One low cyanide (sweet) CM and 1 high cyanide (bitter) CM were studied. One additional group was fed a diet which resembled cassava in nutritional value, but which lacked the cyanogenic glycosides. SCN concn. increased significantly in the urine and blood of dams fed cassava diets. Increased tissue SCN concn. were observed in fetuses recovered from cassava-fed dams. Cassava-fed dams gained significantly less wt. than did control animals and their offspring showed evidence of fetotoxicity. Reduced fetal body wt. and reduced ossification of sacrocaudal vertebrae, metatarsals, and sternebrae were associated with cassava diets. High cyanide cassava diets were also associated with a significant increase in the no. of runts compared with litters from dams fed either low protein or lab. stock diets. (AS)

0513

26882 HARRIS, J.R.; MERSON, G.H.J.; HARDY, M.J.; CURTIS, D.J. 1980. Determination of cyanide in animal feeding stuffs. Analyst 105:974-980. En., Sum. En., 14 Ref.

Cassava. HCN. Cyanogenic glycosides. Feeds and feeding. Analysis. Laboratory experiments. HCN content. Animal health. Hydrolysis. United Kingdom.

A method for determining cyanide in feeding stuffs was developed. Naturally occurring cyano-substituted glycosides were subjected to enzymatic hydrolysis, the liberated cyanide was isolated by aeration and determined either by a spectrophotometric method or by gas chromatography. Recoveries of cyanide added to feeding stuffs at concn. of 10 and 20 mg/kg were approx. 98 percent. Cyanide contents of a cassava matrix were 159, 157, and 150 micrograms/g. Cyanide recoveries were 96.3, 96.8, and 99.1 (amygdalin-fortified cassava) for the spectrophotometric method and 95.9, 96.3, and 97.1 percent (linamarin-fortified cassava) for gas chromatography. The method is sensitive to as little as 1 mg cyanide/kg. (AS)

0514

28121 1985. HOJAS DE yuca y rastrojo de maíz en la alimentación de bovinos en crecimiento. (Cassava leaves and maize stubble in growing bovine cattle nutrition). ICA Informa 19(4):10-12. Es., Il.

Cassava. Cassava leaves. Animal nutrition. Dairy cattle. Supplements. Colombia.

Ground cassava leaves were given to 12 Holstein heifers, with an initial live wt. of 190 kg, during 95 days as a supplement to grazing Digitaria decumbens pastures, compared with the supply of green alfalfa. At the end of the trial, the final av. wt. of the heifers fed ground cassava leaves was 256.3 kg, corresponding to a total wt. gain of 67.3 kg and a wt. gain/day/yr of 0.684 kg. Heifers fed green alfalfa reached a total wt. gain of 57.7 kg and a wt. gain/day/yr of 0.589 kg. Animals that consumed cassava leaves had a 40 percent higher energy intake, which accounted for the higher wt. gain and the more efficient production. (CIAT)

0515

28577 HUYGHEBAERT, G.; DE GROOTE, G. 1984. Eclairage intermittent chez les poules pondeuses et remplacement des céréales dans les rations de ponte distribuées sous forme de farine et de granulés. (Intermittent lighting for laying hens and substitution of cereals in laying rations given as meal or pellets). Revue de l'Agriculture 37(5):1245-1260. Fr., Sum. Fr., En., 29 Ref., Il. [Centrum voor Kleinveeteelt, Sektie 1 (I.W.O.N.L.) Burgem, Van Gansberghelaan, 92 B-9220 Merelbeke, Belgium]

Cassava. Feeds and feeding. Animal health. Nutritive value. Dietary value. Animal nutrition. Diets. Pellets. Belgium.

In a 3 x 2 x 2 factorial expt., laying hens were given pelleted feed (maize or cassava plus 25 percent soybean oil and 75 percent animal fat) ad libitum, meal ad libitum, or pelleted feed restricted to the same amount as that taken by hens given meal. The effect of continuous (16 h light:8 h dark) or intermittent lighting (16 h of 1/4 light and 3/4 dark; 8 h dark) was also studied. When pelleted diets were given freely there was higher feed intake (7-8 percent), lower feed conversion (8-9 percent), and lower egg production (0.8 percent) than when meal was given. There was no significant difference in performance of hens given diets of different composition. Intermittent lighting significantly reduced feed intake (3-4 percent) and improved feed conversion efficiency (3-4 percent) despite a significantly lower egg wt. Intermittent lighting also reduced lighting costs by 50 percent. (AS (extract))

0516

29029 JACKSON, L.C.; CHANDLER, J.P.; JACKSON, R.T. 1986. Inhibition and adaptation of red cell glucose-6-phosphate dehydrogenase (G6PD) in vivo to chronic sublethal dietary cyanide in an animal model. Human Biology 58(1):67-77. En., Sum. En., 38 Ref., Il. [Dept. of Anthropology, 117 Kroeber Hall, Univ. of California, Berkeley, CA 94720, USA]

Cassava. HCN. HCN content. Laboratory experiments. Laboratory animals. Animal health. Human health. Enzymes. HCN absorption. USA.

Red cell G6PD (glucose-6-phosphate dehydrogenase) enzyme activity was studied for 20 wk. in twelve 5-wk.-old miniature swine littermates receiving isocaloric, cyanide (CN-) variable rations at proportions of dietary CN- approximating the cassava-derived ingestion levels of Liberian human groups. The hematological status and G6PD isozyme patterns were identical for all animals. Serum SCN levels were positively correlated with dietary CN- intake levels ($r = 0.83$, p less than 0.01). Over the course of the expt., high treatment animals receiving 1.2 mg CN-/day/kg body wt. demonstrated significantly depressed overall mean enzyme activity (p less than 0.025) when compared with control animals (0 mg cyanide), particularly during the 1st 12 wk. of the study. After wk. 16, the rate of enzyme inactivation in high treatment animals declined and activity levels began to converge with those of control animals. For animals receiving 0.4-0.7 mg CN-/day/kg body wt., red cell G6PD enzyme inhibition was initially delayed; however, by wk. 20 activity levels were lower than either the control or high treatment groups. A less pronounced general decline in enzyme activity was observed in all animals and associated with aging. The possible health and evolutionary implications of these enzymatic responses to sublethal dietary CN- are discussed. (AC)

0517

27647 LAHLACE, J. P.; DARCY-VRILLON, B. 1984. Motricité de l'intestin grele et digestibilité iléale d'un régime a base de manioc chez le porc. (Small intestine motility and ileal digestibility of a cassava diet in pigs). Annales de Zootechnie 33(4):489-508. Fr., Sum. Fr., En., 14 Ref., Il. [Inst. National de la Recherche Agronomique, Laboratoire de Physiologie de la Nutrition, Centre de Recherches Zootechniques, F 78350 Jouy-en-Josas, France]

Cassava. Swine. Diets. Animal physiology. Digestibility. Analysis. Laboratory experiments. Dry matter. Toxicology. France.

Four Large White castrated male pigs, averaging 50 kg live wt., were used to estimate the effects of incorporating cassava into the diet on the motility of the small intestine and the apparent digestibility in the distal small intestine. Two of the pigs, fitted with chronical electrodes implanted at 7 sites along the small intestine, were used to study the motility pattern of myoelectric migrating complexes during ingestion of semipurified diets including 72.4 percent CM or 66.3 percent purified maize starch. Each diet contained 16 percent total CP, mainly supplied by fish meal. Parallel to that, a commercial standard diet including 30 percent CM was tested in the same exptl. conditions. The other 2 pigs, subjected to an ileo-colic postvalvular fistulation, were used in a qualitative and quantitative study of digesta collected at the ileo-caeco-colic junction after intake of a semipurified diet containing CM. The results were compared with those previously obtained with a diet based on purified maize starch. The amounts of fresh and dry matter collected in the distal small intestine were, resp., 2.5 and 1.7 times larger with the semipurified cassava diet than with the maize starch diet. The DM content of digesta averaged only 7 percent for the cassava diet vs. 11 percent for the maize diet. The ileal apparent digestibility of starch was subtotal for the 2 diets, while those of DM and N were highly reduced (78 percent for cassava vs. 87 percent for maize). The motility pattern of myoelectric complexes was almost maintained with the semipurified cassava diet; however, some important changes in the characteristics of the complexes may be directly related with the increase in the vol. of the more fluid cassava digesta. The rise in the level of intake when feeding the standard diet aggravated these effects and led to a true disturbance of the motility

pattern. These observations can be associated with the presence in CM of almost 5 percent simple carbohydrates liable to be responsible for the afflux of water towards the intestinal lumen and thus for the motility changes; furthermore, the presence of phenol compounds and tannins is most likely rsponsible for the reduced ileal digestibility of DM and N. These features in connection with the irregular qualitative characteristics of the raw materials may lead to pathological situations such as the recurrent diarrhea syndrome. (AS)

0518

27642 OBIOHA, F.C.; UJOH, S.C.; OKORO, E.O.; OZIGBU, D. 1985. The complete substitution of cassava peel meal for maize in pig grower-finisher rations. Nutrition Reports International 31(1):35-41. En., Sum. En., 8 Ref. [Dept. of Animal Science, Univ. of Nigeria, Nsukka, Nigeria]

Cassava. Animal nutrition. Feeds and feeding. Cassava peel meal. Diets. Swine. Laboratory animals. Maize. HCN content. Substitutes. Nigeria.

Five isocaloric and isonitrogenous pig grower-finisher diets, in which maize was progressively replaced by processed cassava peel (CPM) from 60 to 0 percent of the whole diet, were fed to 30 pigs averaging 22.50 plus or minus 3.82 kg until slaughter wt. of 38.80 plus or minus 7.44 kg. There was a progressive decline in av. daily gain, feed efficiency, and PER from the zero CPM ration to the zero maize ration, but these comparisons were not significant. The control ration was, however, inferior to the zero maize ration in dressing percentage and back fat thickness. Per cent liver wt., heart wt., and spleen wt. were slightly higher in the CPM diets than in the control diet. (AS)

0519

27599 TEWE, O.O.; MAHER, J.H. 1980. Cyanide, protein and iodine interactions in the performance, metabolism and pathology of pigs. Research in Veterinary Science 29:271-276. En., Sum. En., 17 Ref., Il. [Dept. of Animal Science, Univ. of Ibadan, Ibadan, Nigeria]

Cassava. Cyanides. HCN. Iodine. Protein. Animal physiology. Endemic goitre. Diets. Dietary value. Laboratory animals. Swine. Animal health. Nigeria.

Performance and metabolic and pathological changes were evaluated in 48 growing pigs fed different levels of dietary protein, cyanide, and I. Protein deficiency reduced urinary I excretion and the serum concn. of protein, protein-bound I, and SCN. It also reduced liver rhodanese activity and caused a decrease in urinary SCN excretion that was not significant. Dietary cyanide increased urinary SCN and I excretion and serum SCN concn. while the basal diet reduced urinary I excretion and serum protein-bound I. Pathological studies showed that cyanide treatment had no marked effect on the microanatomy of the tissues examined. Dietary protein deficiency caused histological changes in the thyroid gland and bone which suggested a decline in metabolic activity. I deficiency caused hyperplastic goitre in the exptl. animals. (AS)

0520

27654 WU, J.F.; HUANG, M.D.; CHEN, S.Y. 1985. (Effect of dietary sweet potato chips, cassava chips and cassava pomace on nutritional value for growing pigs). Journal of the Agricultural Association of China 131:49-55. Ch., Sum. Ch., En., 14 Ref.

Cassava. Cassava products. Digestibility. Diets. Nutritive value. China.

Nine crossbred gilts averaging 35 kg were used to determine apparent digestibilities, energy and N metabolism of diets containing (1) sweet

potato chips, (2) cassava chips, and (3) cassava pomace. Apparent DM and energy digestibilities of diets 1 and 2 were significantly higher than those of diet 3. Apparent N digestibility of diet 2 was significantly higher than those of diets 1 and 3, but differences were not significant between diets 1 and 3. Apparent cell wall, acid detergent fiber, and hemicellulose digestibilities of diet 3 were significantly lower than those of diets 1 and 2 due to its high content of acid detergent fiber. Digestible energy and ME for diet 3 were significantly lower than for diets 1 and 2. The excretion of fecal N for diet 3 was significantly higher than for diet 2, but urinary N excreted for diet 3 was lower than for diet 2. N retention showed no significant difference between dietary treatments. Based on these results, nutritive values of diet 3 were slightly lower than those of diets 2 or 1. Although cassava pomace contained higher percentage of cell wall, most of them could be utilized by growing pigs. (AS) See also 0401 0506 0507 0508 0534

H04 HCN Toxicity and Detoxification

0521

27697 DUFOUR, D.L. 1985. The effectiveness of a traditional processing technique in reducing the toxicity of manioc. Boulder, University of Colorado. Department of Anthropology. 14p. En., Il. Paper presented at the 1985 Annual Meetings of the American Anthropological Association in Washington, D.C..

Cassava. Processing. HCN content. Detoxification processes. Technology. Colombia.

The results of a pilot project that attempted to assess the effectiveness of the processing technology, used by the Tukanoan Indians in the Northwest Amazon (Yapu, Vaupes, Colombia) in reducing the toxicity of cassava, are presented. Tukanoan Indians cultivate over 40 cassava var. of which they prefer the toxic ones that are processed for consumption. The total cyanide content estimated for raw peeled roots was approx. 700 ppm. The traditional processing technique (peeling, washing, grating, and separation into liquids, starch, and fiber) and cooking reduced cyanide content from 2000 ppm to 19 ppm in the boiled juice and 10 ppm in the bread. Thus, the technique proved effective to reduce cassava toxicity. (CIAT)

0522

28600 EZEALA, D.O.; OKORO, N. 1986. Processing techniques and hydrocyanic acid content of cassava-based human foodstuffs in Nigeria. Journal of Food Biochemistry 10(2):125-132. En., Sum. En., 16 Ref. [Dept. of Botany, Univ. of Port Harcourt, P.M.B. 5323, Port Harcourt, Nigeria]

Cassava. HCN content. Food products. Gari. Foofoo. Processed products. Cassava chips. Nigeria.

The HCN content of peeled cassava tubers from various localities in eastern Nigeria (major cassava growing and consuming area) varied from 26.0 plus or minus 1.6 to 38.0 plus or minus 2.6 mg/100 g fresh wt. There was no correlation between the cyanide contents of cassava tubers and locality. Processing the tubers with the highest cyanide content into different forms of cassava-based foodstuffs (gari, fufu, cassava cake, and cassava chips for cassava salad) consumed in Nigeria resulted in an undetectable amount of cyanide. It is concluded that these cassava-based foodstuffs are free from cyanide toxication, and the incidence of ataxic neuropathy associated

with prolonged consumption of cassava as a result of its cyanide content is not due to prolonged consumption of processed cassava products. (AS)
See also 0504 0507 0512 0516 0519

I00 PROCESSING, PRODUCTS AND USES

0523

28578 BA'I, S.; GHAZALI, H.M. 1986. Production of cassava syrup with glucoamylase immobilised to acid-washed charcoal. Pertanika 9(1):125-129. En., Sum. Mal., En., 15 Ref., Il. [Dept. of Food Science, Faculty of Food Science & Technology, Universiti Pertanian Malaysia, 43400 Serdang, Selangor, Malaysia]

Cassava. Cassava syrup. Cassava starch. Glucoamylase. Industrial starches. Industrial microbiology. Cassava products. Malaysia.

Glucoamylase immobilized to acid-washed animal charcoal was used for saccharification of liquefied cassava starch. A 7 dextrose equivalent liquefied cassava starch solution (30 percent total dry substance) was converted to a 69 dextrose equivalent cassava syrup when fed at a flow rate of 1.0 ml/min into a packed-bed column reactor of immobilized glucoamylase. The relationship between flow rate and extent of saccharification was asymptotic. Much of the brown color developed during liquefaction of the substrate was removed at low flow rates. (AS)

0524

28123 LEMAIRE, H. 1986. Production of ethyl alcohol from cassava starch; a project work in chemistry. Ghana, University of Cape Coast. 35p. En., Sum. En., 36 Ref., Il.

Cassava. Ethanol. Industrial starches. Laboratory experiments. Hydrolysis. Fermentation. Biochemistry. Cassava starch. Ghana.

The methods used in the conversion of cassava starch to glucose and its subsequent conversion to ethyl alcohol were studied, and a lab.-scale production procedure was devised. The effect of various factors (base and mineral acid used in hydrolysis) on the yield of ethyl alcohol was studied. Results indicated that yields of ethyl alcohol from hydrolysates of HCl were higher than yields from H_2SO_4 hydrolysates. Likewise, yields from hydrolysates with pHs adjusted with $CaCO_3$ prior to fermentation were higher than yields from hydrolysates with pHs adjusted with Na_2CO_3. Furthermore, the addition of Pasteur salt solution slightly increased the yield from hydrolysates with pHs adjusted with $CaCO_3$ and considerably decreased the yield from hydrolysates with pHs adjusted with Na_2CO_3. (AS)

0525

27807 OKAFOR, N.; EJIOFOR, M.A.N. 1985. The linamarase of Leuconostoc mesenteroides: production, isolation and some properties. Journal of the Science of Food and Agriculture 36(8):669-678. En., Sum. En., 16 Ref., Il. [Dept. of Industrial Microbiology, Anambra State Univ. of Technology, P.M.B. 5025, Awka, Nigeria]

Cassava. Linamarase. Linamarin. Industrial microbiology. HCN. Hydrolysis. Leuconostoc mesenteroides. Biochemistry. Nigeria.

Leuconostoc mesenteroides was found to produce highly active linamarase when linamarin was incorporated in its growth medium. The enzyme was isolated from the bacterium and partially purified using diethylaminoethyl (DEAE) cellulose. Its activity was measured

spectrophotometrically using linamarin extract from cassava tissues. This yielded 62.2 mg oyanide/g of linamarin. A study of some of its properties showed it was active in the temp. range of -10 to +45 degrees Celsius, with an optimum at 29 plus or minus 2 degrees Celsius. Activity was observed over a wide pH range, 4.0-8.0, with optimum at 6.0-6.5. Its pH of stability was 5.5-7.5, while above pH 8.0 there was a rapid loss of activity. Incubating the enzyme at 50 degrees Celsius led to loss of over 90 percent of its activity within 18 min. The optimal substrate concn. was 0.15-0.20 mg/ml. Whereas above 0.25 mg/ml there was no observable increase in activity, loss of activity became more pronounced below 0.10 mg/ml of substrate. (AS)

0526

28595 SHAMALA, T.R.; SREEKANTIAH, K.R. 1986. Saccharification of tapioca starch residue with a multienzyme preparation of Aspergillus Ustus. Starch/Starke 38(12):428-432. En., Sum. En., De., 8 Ref. [Discipline of Microbiology & Sanitation, Central Food Technological Research Inst., Mysore-570013, India]

Cassava. Arpergillus. Enzymes. Molds. Fermentation. Hydrolysis. Industrial starches. Industrial microbiology. Saccharomyces cerevisiae. India.

An enzyme preparation obtained by cultivating Aspergillus ustus on rice straw-wheat bran mixture (7:3) had cellulase, D-xylanase, alpha-amylase, beta-D-glucosidase, amyloglucosidase, and pectinase activities. Used at a 2 percent level with cassava starch residue (CSR) slurry gelatinized at 80 degrees Celsius or pressure cooked, it yielded 45-60 percent reducing sugar and degraded 52-65 percent of the fiber material. When saccharification was enhanced (72 percent), fiber degradation (75 percent) could be achieved by pretreating the substrate with mineral acid. Fermentation of the hydrolysates with Saccharomyces cerevisiae produced 29-36 ml alcohol/100 g of sun-dried CSR. Data are presented on CSR hydrolysis by alpha-amylase and amyloglucosidase, A. ustus enzyme preparation individually and in combination with amyloglucosidase, in acid pretreated or untreated CSR. (AS) See also 0615

I01 Cassava Starch and Its Properties

0527

29020 FUJIMOTO, S.; TOMINAGA, T.; SUGANUMA, T.; NAGAHAMA, T. 1985. (Starches in China. 1. Some starches on the market). Bulletin of the Faculty of Agriculture, Kagoshima University no.35:55-63. Ja., Sum. En., 40 Ref., Il.

Cassava. Composition. Industrial starches. Cassava starch. Food products. China.

Ten types of starches produced in China and sold in the local markets in China and some Chinese towns in Japan were examined for general properties such as granule size and shape, X-ray diffraction pattern, I coloration, swelling power, solubility, and amylographic characteristics. The starches of kudzu vine, edible canna, and cassava showed typical characteristics. Several of the samples sold had labels indicating another type of starch than the real one: 1 of sorghum starch was labeled sweet potato starch and another labeled mung bean starch was cassava starch. Lotus root starch and cassava starch had similar I coloration spectrums. (AS (extract))

0528

29032 KOBA, Y.; FEROZA, B.; FUJIO, Y.; UEDA, S. 1986. Preparation of koji from corn hulls for alcoholic fermentation without cooking. Journal of Fermentation Technology 64(2):175-178. En., Sum. En., 8 Ref., Il. [Dept. of Food Science & Technology, Faculty of Agriculture, Kyushu Univ., Hakozaki, Higashi-ku, Fukuoka 812, Japan]

Cassava. Food products. Industrial starches. Alcohol. Biochemistry. Fermented products. Japan.

Maize hulls, the outer peel covering the maize grain, were used for preparation of koji, which was applied to alcoholic fermentation without cooking of raw starchy materials. Maize hull koji had lower saccharifying power, alpha-amylase, CMCase, and xylanase than wheat bran koji, but higher protease and pectinase activities. Its alcoholic fermentations of cassava starch and sweet potato were also superior to those of wheat bran koji: maize hull koji gave 10.3 percent (vol./vol.) of alcohol with 93.0 percent yield from 20 g of cassava starch, while wheat bran koji gave 9.4 percent (vol./vol.) of alcohol with 90.4 percent yield. (AS)

0529

28199 MOORTHY, S.N.; RAMANUJAM, T. 1986. Variation in properties of starch in cassava varieties in relation to age of the crop. Starch/Starke 38(2):58-61. En., Sum. En., De., 15 Ref., Il. [Central Tuber Crops Research Inst., Sreekaryam, Trivandrum 695017, India]

Cassava. Starch content. Cultivars. Growth. Maturation. Developmental stages. India.

Cassava starch, extracted from 6 var. (H 97, H 165, H 226, H 1687, H 2304, and M4) at different periods of growth, was examined for various physicochemical properties: granule size, reducing value, swelling vol., swelling power, and amylose content. The granule size increased in all the var. up to 6 mo. after tuber initiation and thereafter remained almost constant. The amylose content and reducing values did not vary much at different stages of growth. The swelling vol. and swelling power of starch showed large variations particularly after 10 mo. Such changes of 4 var. were not noticed in other var. Associative binding forces of starch molecules largely determine the stability characteristics of starch under varied environmental conditions. (AS)

0530

29025 OKOZI, T.O.; DORE, R.O.; AKARANTA, O.; HART, A.E. 1986. Using carboxymethylated cassava (Manihot) wastes as thickeners for latex paint. Carbohydrate Polymers 6(4):249-256. En., Sum. En., 7 Ref. [Dept. of Applied Chemistry, Univ. of Port Harcourt, Port Harcourt, Nigeria]

Cassava. Waste utilization. Industrial starches. Nigeria.

CSW carboxymethylated to a degree of substitution in the range of 0.42-0.61 have been prepared and used as thickening agents for the formulation of water-based latex paints. It was found that paint thickened with cassava waste-based sodium carboxymethyl starch acquired a mechanical strength and drying time comparable with paint formulated with the commercial grade thickeners such as Tylose and Natrosol. (AS)

0531

27698 SABINIANO, N.S. 1985. Effects of different additives on the physicochemical properties of some starches. Thesis. Mag.Sc. College, Laguna, University of the Philippines at Los Baños. 117p. En., Sum. En., 70 Ref., Il.

Cassava. Cassava starch. Industrial starches. Preservatives. Gelatinization. Viscosity. Aluminum sulphate. England.

Basic information is provided on how mung bean, maize, and cassava starches will behave in the presence of additives. Possible applications in food systems are indicated. Effects of 0.25 and 1.00 percent concn. of alum, sodium tripolyphosphate, urea, and noodle improver on the viscosity, swelling power and solubility, gel consistency, degree of gelatinization, gel strength, and degree of syneresis of mung bean, maize, and cassava starches were determined. Viscosity of the 3 starches was significantly decreased by all additives at both concn.; however, that of mung bean starch was increased by urea and noodle improver. Swelling power of all starches was decreased by alum at the lower pasting temp. but was increased at 80 degrees Celsius and higher. Sodium tripolyphosphate decreased the swelling power of mung bean and cassava starches while it had the same effect as alum on maize starch. Urea and noodle improver significantly increased the swelling power of mung bean starch but had no significant effect on the swelling of maize and cassava starches. The solubility patterns of all starches were significantly increased by all additives except the noodle improver. Increasing concn. of additives from 0.25 to 1.00 percent gave variable results for gel consistency of starches, except for sodium tripolyphosphate which decreased the gel consistency of all starches. Degree of gelatinization of cassava starch was decreased by alum and sodium tripolyphosphate while urea and noddle improver increased it. Hardness and viscosity of cassava starch gels were not significantly affected by all additives, except for the increase caused by 1.00 percent alum. Cassava starch gels did not exhibit any syneresis. (AS (extract))

0532

28573 TREGUBOV, N.N.; PAVLOVSKAYA, O.E.; TOBISH, U. 1984. (Characteristics of extruded cassava starch). Sakharnaya Promyshlennost' no.7:56-59. Ru., 3 Ref., Il.

Cassava. Cassava starch. Industrial starches. Food products. Human nutrition. Diets. Processing. URSS.

Conditions of cassava starch extrusion considerably affect the dynamic viscosity of the extruded product. With higher water content in the raw material the viscosity increased; viscosity dropped with increased processing temp. and higher frequency of extruder worm rotation. Dynamic viscosity of extrudates was 4.0-4.5 times lower than that of raw starch. Solubility and water binding capacity of cassava starch extrudates increased when higher temp. prevailed in initial water dispersions of the starch. The extrudates were readily attacked by amylase and had high maltose contents, which improved their food value. No mono and disaccharides were formed on cassava extrusion, and chromatography indicated that a change of intermolecular linkages of polysaccharide chains occurred. (Food Science and Technology Abstracts) See also 0400 0529

I02 Uses, Industrialization, Processing and Storage

0533

28574 KAWABATA, A.; SAWAYAMA, S.; ROSARIO, R.R. DEL; NOEL, M.G. 1986. Effect of storage and heat treatments on the sugar constituents in cassava and yambean roots. Journal of the Japanese Society for Food Science and Technology 33(6):441-449. En., Sum. En., Ja., 17 Ref., Il. [Dept. of Nutrition, Faculty of Agriculture, Tokyo Univ. of Agriculture, 1-1-1, Sakuragaoka, Setagaya-ku, Tokyo 156, Japan]

Cassava. Roots. Storage. Sugar content. Fructose. Glucose. Linamarin. Deterioration. Japan.

The effects of storage and heat treatments on the sugar constituents of cassava and yambean (Pachyrhizus erosus) roots were investigated using high performance liquid chromatography. Essentially, the total sugar content increased during the 1st 1 or 2 wk. of any 18- to 28-day storage period. Also, the ratios of fructose and glucose to total sugar content increased, while the ratios of sucrose and inositol decreased. The linamarin content increased markedly in the 1st 7 days, and continued to increase for several additional days; then it gradually declined and almost disappeared before decay. In yambean root, the 3 sugars of glucose, fructose, and sucrose were found. Although heat treatments by boiling, roasting, and drying all tended to increase the total sugar content of these roots, the linamarin content of cassava roots and of finely chopped cassava leaves showed a significant tendency to decrease by such treatments. The changes in the constituent pectic substances of these roots were also studied. Finally, the changes in appearance occurring in cassava root tissue during storage and heat treatment were observed with a scanning electron microscope. (AS)

0534

28313 MATTEI, R. 1984. Sun-drying of cassava for animal feed: a processing system for Fiji. Suva, Fiji, Food and Agriculture Organisation of the United Nations, RAS/83/001. Field Document 3. 45p. En., Sum. En., 21 Ref., Il.

Cassava. Solar drying. Animal nutrition. Feeds and feeding. Industrial machinery. Storage. Costs. Income. Labor. Fiji.

A system of producing dry cassava chips for use as a cereal substitute in animal feeding, developed at Koronivia Research Station (Suva, Fiji), is described. The equipment consists of a chipping machine having an output of 1 t/h, a washing-peeling machine made from locally available materials, and 40 drying trays having a total area of 200 square meters. During unfavorable weather the drying trays are stacked under 8 portable covers. The use of cassava in animal feeding, quality standards, and storage requirements for cassava chips are discussed, together with projected economic returns to cassava producers, producer-processors, and full-time processors. Although the drying capacity of the equipment varies throughout the year depending on weather conditions, annual drying capacity of 120 t of chips (equivalent to 300 t of fresh cassava) is expected. Detailed instructions on the manufacture of the equipment are included in the appendices. (AS (extract))

0535

29005 ONAYEMI, O. 1985. Sensory texture profile of African foods made from yam and cassava. Journal of Texture Studies 16(3):263-269. En., Sum. En., 16 Ref. [Dept. of Food Science & Technology, Univ. of Ife, Ile-Ife, Nigeria]

Cassava. Food products. Gari. Cassava flour. Industrialization. Industrial machinery. Nigeria.

Textural characteristics of African foods made from yam and cassava (gari and flour) were characterized by sensory profile techniques. Products with identical processing techniques reconstituted to the same MC showed similar characteristics of firmness, adhesiveness, and ease of working to a spherical mass. The important attributes of smoothness, springiness or bounciness, and ease of swallowing without mouth coating were common to all products and are good measures of overall acceptability. This method is

simple and provides a method of quality control that could be used by industrial manufacturers of these products. (AS)

0536

28370 ONWUEME, I.C. 1981. A delivery system for cassava in Nigeria -- a keynote address. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.3-7. En., 1 Ref.

Cassava. Harvesting. Peeling. Rasping. Small-scale processing. Postharvest technology. Marketing. Kpokpo gari. Nigeria.

A delivery system for cassava in Nigeria is proposed in an attempt to solve the cassava root supply problems of Nigerian processing factories. Cassava is hand harvested and peeled by the farmer and his family, and then delivered to the village, where it is grated and dewatered. The dewatered mash is collected by agents and taken to a central frying factory where it is processed into gari. Advantages and disadvantages of this system are discussed. (CIAT)

0537

29004 POOSARAN, N.; HEYES, R.H.; ROGERS, P.L. 1985. Ethanol production from cassava starch using a highly productive strain of Zymomonas mobilis and Saccharomyces uvarum ATCC 26602. Biomass 7(3):171-183. En., Sum. En., 23 Ref., Il. [School of Biotechnology, Univ. of New South Wales, P.O. Box 1, Kensington 2033, Australia]

Cassava. Ethanol. Cassava starch. Zymomonas. Amylase. Biochemistry. Industrial microbiology. Fermentation. Saccharomyces. Australia.

The liquefaction, simultaneous saccharification, and fermentation of cassava starch (225 g/liter glucose equivalent) were investigated to optimize the process. It was found that with 0.125 percent (vol./wt.) alpha-amylase (Termamyl) at 80 degrees Celsius an 1-h liquefaction was sufficient. At 35 degrees Celsius and an optimum amyloglucosidase concn. of 0.7 percent (vol./wt.), Zymomonas mobilis ZM4 had a fermentation time of 20 h, giving 114 g ethanol/liter (95 percent of the theoretical yield on starch supplied). Under the same conditions, Saccharomyces uvarum ATCC 26602 had a fermentation time of 33 h, producing 106 g ethanol/liter (a 90 percent yield). The main factors affecting the rate of fermentation with varying amyloglucosidase concn. were glucose limitation (at low amyloglucosidase concn.) and substrate inhibition (at high amyloglucosidase concn.). (AS) See also 0403 0430 0437 0438 0439 0454 0476 0506 0510 0521 0522 0528 0530 0531 0532 0539 0547 0569 0607 0609 0618

I03 Industrial Microbiology

0538

26828 MABESA, R.C.; VILLARALVO, J.A.; MELENDRES, R.R. 1984. Isolation, screening and identification of fungi for protein enrichment of root and tuber crops. Philippine Agriculturist 67(1):9-16. En., Sum. En., 11 Ref. [Inst. of Food Science & Technology, College of Agriculture, Univ. of the Philippines at Los Baños, College, Laguna, Philippines]

Cassava. Aspergillus. Protein enrichment. Fermentation. Sugar content. Cassava chips. Biochemistry. Philippines.

Molds growing in decaying root and tuber crops such as cassava, sweet potato, gabi, potato, and giant swamp taro (Cryptosperma chamissomis) were

isolated and screened for protein production. At least 3 promising strains from each crop were selected for identification. Isolates from cassava possessed the characteristics of Aspergillus flavus, A. sulphureus, and Penicillium simplicissinum. Fermentation with fungi considerably increased the original protein content of the root crops. Fungi with the highest amylolytic activity gave the highest protein yield in the product. 'AS (extract))

0539

28576 RUBICO, S.M.; SANCHEZ, P.C.; ESCUETA, E.E. 1984. Fungal protein production using cassava (Manihot esculenta Crantz) flour as substrate. 1. Isolation, screening and identification. Philippine Agriculturist 67(2):201-208. En., Sum. En., 14 Ref.

Cassava. Industrial microbiology. Isolation. Aspergillus. Molds. Proteins. Cassava flour. Philippines.

Fungal isolates were collected from rotten cassava and bubod (rice wine starter) and 2 identified strains each of Aspergillus oryzae and A. awamori were screened for protein production. Of the 39 isolates screened, 12 had over 43 percent carbohydrate conversion efficiency and were considered to have a good potential for biomass production. A 2nd screening was done for these 12 isolates, using 5 different nutrient media, and 4 isolates were selected. Two of the isolates were from A. awamori, while 2 others (BU2 and St3) were from A. japonicus and A. petrakii, resp. (AS) See also 0400 0527 0528 0537

J00 ECONOMICS AND DEVELOPMENT

0540

28390 ADEYEMO, A. 1981. Oyo State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.175-181. En.

Cassava. Adaptation. Technology transfer. Cassava programs. Planting. Cultivars. Fertilizers. Propagation. Seed. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Oyo, Nigeria, is presented. Cassava var. and fertilizer minikit trials, farmer integration into cooperatives, field days, training and seed multiplication activities, and agroservice center development are reported. Cassava var. 30572 was outstanding. Constraints to planned trials and to increased cassava production are briefly discussed. Plans for 1981 are indicated as well as financial requirements. (CIAT)

0541

28506 AKINPELU, M. 1982. Encourage cassava production and enhance Nigeria agriculture. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.54-59 En.

Cassava. Socioeconomic aspects. Development. Nigeria.

Problems faced by Nigerian cassava growers are listed and briefly discussed; possible solutions to them are proposed. These problems involve machinery for land preparation, agricultural credits and inputs, extension services, cassava diseases and pests, rural development, the National Seed

Service, marketing, cassava multiplication and distribution through River Basin Development authorities. (CIAT)

0542

28389 AKINRELERE, J.O. 1981. Ondo State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.169-174. En.

Cassava. Cassava programs. Productivity. Maize. Intercropping. Seed. Propagation. Cultivars. Adaptation. Fertilizers. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Ondo, Nigeria, is presented. Seed multiplication activities and cassava/maize trials during 1979 and 1980 are reported. Yield data are reported for only 6 of 15 exptl. stations; fertilized plots yielded higher than unfertilized plots. Constraints to research activities are discussed. The current situation of the trials is briefly analyzed. (CIAT)

0543

28505 ANUEBUNWA, F.O. 1982. Evaluation of farmer adoption of National Accelerated Food Production Project (cassava/maize) package recommendations. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.36-53. En., Sum. En., 5 Ref.

Cassava. Socioeconomic aspects. Development. Technology transfer. Statistical data. Nigeria.

The results of a survey among NAFPP (National Accelerated Food Production Programme) cassava/maize farmers in 5 participating states (Imo, Anambra, Rivers, Bendel, and Ondo) are presented to identify key constraints to technology transfer and adoption. A high degree of awareness of the NAFPP cassava/maize improved technology package was achieved. All components of the package reached the trial stage of the adoption process; most farmers adopted improved cassava and maize var. as well as fertilizers. The most important factors limiting farmer adoption were the untimely supply of improved cassava planting material, maize seeds, fertilizers, and pesticides as well as the increased labor costs for ridging, lack of credit, and storage and marketing problems. (CIAT)

0544

28175 AZIH, V.A. 1979. Essential features of cassava variety and fertilizer minikit trials demonstrations and production. Umudike, Nigeria, National Root Crops Research Institute. 14p. En., 3 Ref. Paper presented at the 3rd NAFPP National Cassava Workshop, Umudike, 1979.

Cassava. Technology transfer. Cultivars. Fertilizers. Planting. Spacing. Intercropping. Maize. Cultivation. Technological package. N. P. K. S. Nigeria.

The procedures used to conduct var. and fertilizer trials, demonstrations, and commercial-scale production field tests, in a joint effort between researchers and cassava farmers, are described. The essential ingredient of trials and demonstrations is that farmers are fully involved in the whole process of field operations, var. identification, and fertilizer rate selection for their own environments. Criteria for selecting suitable sites and farmers for trials and demonstrations are given. This methodology is primarily designed to accelerate farmer adoption of

improved technology and provide researchers with a unique opportunity to get the necessary feedback from farmers, extension workers, and consumers. (CIAT)

0545

28346 BARTLETT, C.D.S.; IKEORGU, J.E. 1980. A review of minikits and of the economics of recommended practices for cassava production. In NAFPP National Cassava Workshop, 4th., Umudike, Nigeria, 1980. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.32-34. En.

Cassava. Development costs. Production. Technology transfer. Nigeria.

Recommendations on the introduction of socioeconomic surveys and the modification of cassava minikit trials and production kits are given, based on the type of information feedback from participant farmers. Socioeconomic surveys and zonal trials yield more important information on innovations than minikits. On the other hand, minikit trials should be modified as follows: var. minikits should continue but more information should be gathered on farmers' likes and dislikes; fertilizer, herbicide, and planting method minikits should be discontinued; production kits should continue but more information gathered on farmers' likes and dislikes of new method; less emphasis should be given to yield data from minikits and production kits. (CIAT)

0546

28537 BENNISON, H. 1987. Cassava. Its developing importance. Courier no.101:69-71. En., Sum. En., Il.

Cassava. Cassava programs. Ecosystems. Cultivation. History. Food security. Plant breeding. Africa.

The factors that have contributed to the increasing importance of cassava in the tropics as a staple food crop during this century, especially in Africa where it has substituted other root crops and cereals, are discussed. Attributes of cassava, attractive to the farmer, are its steady increment in yield over several seasons, drought tolerance, and ability to grow under a wide range of soil fertility conditions. Breeding efforts in Africa over the last years are mentioned, especially regarding resistance to mosaic, CBB, and biological control of mealybugs and the green spider mite, major cassava pests in the region. (CIAT)

0547

26138 BEST, R., ed. 1984. Plan piloto para el desarrollo agro-industrial del cultivo de la yuca en algunos departamentos de la Costa Atlántica de Colombia. (Pilot plan for the agroindustrial development of cassava in some departments of the Colombian Atlantic Coast). Tercer informe junio 1983-junio 1984. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. 135p. Es., Sum. Es. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Production. Processing. Cassava programs. Developmental research. Technology evaluation. Socioeconomic aspects. Costs. Prices. Trade. Drying. Labor. Cultivation. Cultivars. Root productivity. Land use. Colombia.

The 1st yr of operation (1983-84) of 6 cassava natural drying plants, established in some departments of the Colombian Atlantic Coast as a result of the successful operation of the Betulia pilot plant (Sucre) established in 1981, is reported. Under the present production and commercialization conditions, the natural drying process of cassava proved to be an economically profitable activity in the region; however, it was sensitive

to fresh root price and the degree of drying plant occupation. The major constraint to increased cassava yields is the lack of programs to produce healthy seed. In regional trials, var. CM 681-2, M Col 22, and M Col 1505 performed similarly or superior to the local var. Venezolana. Studies conducted on agricultural production and marketing in the region indicated that adequate conditions exist for cassava agro-industrialization, especially because of the stagnation of cereal grain production for the animal feed industry and, on the other hand, the reduced demand of fresh roots. Ten new drying plants (3 in Córdoba, 2 in Sucre, 1 in Bolívar, 2 in Atlántico, 2 in Magdalena, and 1 in Cesar) will be established in the second semester of 1984. (CIAT)

0548

28301 BOSTER, J.S. 1986. Exchange of varieties and information between Aguaruna manioc cultivators. American Anthropologist 88(2):428-436. En., 38 Ref.

Cassava. Socioeconomic aspects. Technology transfer. Women. Developmental research. Peru.

The implications of the finding that consensus reflects knowledge and that the approach to the consensus depends on motivation, ability, and opportunities to learn, is explored by examining the social correlates of the pattern of agreement between Aguaruna Jivaro (living in the Amazon basin in northern Peru) in their identification of cassava variables. Three types of links between people are compared: agreement in cassava identification, exchange of cassava var., and kinship. Cassava var. identification expt. were conducted and 70 Aguaruna women were interviewed to test the abovementioned finding. Further research is required. (CIAT)

0549

28586 CONNOLLY, M. 1986. Impact of international and national agricultural research in Nigeria. IITA Research Briefs 7(1):1-3. En., 1 Ref., Il.

Cassava. Cultivars. Maize. Cassava programs. Intercropping. Technology transfer. Developmental research. Germplasm. Disease control. Cassava African mosaic virus. Cassava bacterial blight. Mite control. Mononychellus tanajoa. Phenacoccus manihotis. Nigeria.

The highlights of a study on the impact international agricultural research centers have made on national agricultural research institutes and, through them, on agricultural development in Nigeria are presented. Regarding cassava, the International Institute of Tropical Agriculture (IITA) has been the main contributor of improved germplasm, the most important materials of which are TMS 30572, 50395, 30555, 42025, TMS 4(20), and 1425. Collaboration between IITA and the national agricultural research centers has resulted in the control of major cassava diseases including CAMD and CBB and, more recently, pests such as the cassava mealybug and the green spider mite. Improved cassava intercropping systems have also been developed. Small machines and information exchange are other impact areas briefly discussed. (CIAT)

0550

28384 EJIKEME, C.U. 1981. Imo State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.139-149. En.

Cassava. Cassava programs. Cultivars. Fertilizers. Seed. Development. Socioeconomic aspects. Pest control. Adaptation. Propagation. Productivity. Phenacoccus manihoti. Mononychellus tanajoa. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Imo, Nigeria, is presented. Yield data are reported for the 1979-80 cassava var. trials and fertilizer trials; main conclusions reached are discussed. Results of seed multiplication activities are given and training programs are mentioned. The role of agroservice centers throughout the state is briefly discussed. A brief note on the successful control of Phenacoccus manihoti and Mononychellus tanajoa is presented. Funding and disposal of farmers' produce are the major constraints. (CIAT)

0551

28503 ELEJE, I. 1982. An address to the 6th NAFPP National Cassava Workshop, February 22-26, 1982. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.17-23. En.

Cassava. Development. Socioeconomic aspects. Nigeria.

An overview of the objectives of the NAFPP (National Accelerated Food Production Programme) in Nigeria is presented, including details of the strategy for increased food production and plans for cassava growers that will benefit from efforts that will be made as of 1982 to achieve the final goal of self-sufficiency by 1985. Support will be provided in land clearing and supply of mechanical aids, seed, agrochemicals, and equipment as well as training. A total of 124 groups of cassava farmers will benefit from this support that will be provided to 11 of 20 Nigerian states. (CIAT)

0552

28502 ELEJE, I. 1982. Agricultural revolution in Nigeria; an examination of some angles. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.11-16. En.

Cassava. Cassava programs. Socioeconomic aspects. Technology transfer. Nigeria.

Some factors hindering overall agricultural development in Nigeria are discussed and solutions to overcome them are proposed. Lack of capital and reinvestment in the agricultural sector, pricing incentives for farmers, land tenure, extension and policy interactions, and government projects/agencies are briefly discussed. (CIAT)

0553

28371 ELEJE, I. 1981. Improving our food production efforts through NAFPP workshops. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.8-12. En.

Cassava. Cassava programs. Socioeconomic aspects. Technology transfer. Development. Nigeria.

Suggestions on how to improve the structure and operation of the National Accelerated Food Production Programme (NAFPP) workshops in Nigeria, including those dealing with cassava, are given. Emphasis should be placed on production constraints in the areas of processing, storage, pricing, marketing, and mechanization. Workshop participants should include not only scientists but also extension agents, farmers, government agencies, and private individuals. Extension agent training should also be improved. The decisions reached in each workshop should be formally presented to top policy makers. (CIAT)

0554

28507 ELUAGU, L.S. 1982. The role of marketing in the adoption of the NAFPP technology, by farmers in Imo State. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.60-74. En., Sum. En., 10 Ref.

Cassava. Marketing. Technology transfer. Cassava programs. Socioeconomic aspects. Nigeria.

The cassava marketing problems faced by NAFPP (National Accelerated Food Production Programme) farmers in the state of Imo, Nigeria, were identified; several solutions are proposed. Among the general marketing problems discussed are the lack of adequate storage facilities, poor transportation and communication systems, price instability, shortage of stalls, institutional barriers, lack of information on markets, and lack of wholesalers to purchase the product at the farm gate level. The implications of these factors on NAFPP technology adoption are also discussed. (CIAT)

0555

28373 EZEH, N.O.A. 1981. NAFPP cassava/maize production recommendations: a socio-economic survey of adopters in 4 states of Nigeria. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.29-55. En., 16 Ref.

Cassava. Cassava programs. Technology transfer. Socioeconomic aspects. Development. Statistical data. Intercropping. Maize. Income. Cultivation. Nigeria.

A survey was conducted among NAFPP (National Accelerated Food Production Programme) cassava/maize farmers in 4 Nigerian states (Imo, Anambra, Rivers, and Cross River) to identify key constraints to technology adoption. Information is given regarding social characteristics of farmers, sources of income, use of production inputs and technical information, farmers' response to recommended agronomic practices, production constraints, strategies for improved production, and marketing problems. Farmers' opinions on the approach of NAFPP to improved technology transfer are discussed. While technology transfer has proved effective, production constraints mentioned were (a) the lack of labor, capital, fertilizers, pesticides, and marketing facilities as well as (b) the incidence of insect pests and diseases. (CIAT)

0556

28351 EZEH, N.O.A. 1980. Agricultural credit survey of small farmers in two villages in Oyo State of Nigeria. In NAFPP National Cassava Workshop, 4th., Umudike, Nigeria, 1980. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.67-87. En., Sum. En., 16 Ref.

Cassava. Cassava programs. Statistical data. Production. Socioeconomic aspects. Nigeria.

The results of a survey of the amount, use, and sources of agricultural credit for small farmers in Bode and Ikonifin, Nigeria, for food crop production (including cassava) are presented. Cassava ranks 2nd after yams in percent contribution to farmer income (16.9 percent). Of the loans obtained by farmers, unfortunately none of them were from institutional sources. An analysis of the destination given to the loans is presented. Public credit institutions are recommended to (1) expand their activities and open branches in rural areas, (2) make timely disbursements of loans to

farmers, and (3) remove administrative bottlenecks that limit access of small farmers to agricultural credit. (CIAT)

0557

28387 FATOKUN, P.A. 1981. Lagos State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.158-166. En.

Cassava. Climatic requirements. Cultivars. Productivity. Development. Adaptation. Fertilizers. Propagation. Technology transfer. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Lagos, Nigeria, is presented. Var., fertilizer, demonstration, and multiplication trials carried out during 1979-80 are briefly described. Yield results are reported for the 1980 harvests; cassava var. TMX 30572, 30555, and 30211 performed exceedingly well on farmers' plots. Training activities, field days, and land clearing are also reported. Major constraints are lack of transportation facilities, financing, delay in supply of inputs, and shortage of personnel. Plans for 1981 regarding training and trials are indicated. (CIAT)

0558

27683 FEDERACION NACIONAL DE CAFETEROS DE COLOMBIA. 1985. Yuca Chirosa Armenia. (Cassava variety Chirosa Armenia). In _____. Productos agrícolas perecederos: bases de análisis, proyecciones 1986. Bogotá, Departamento de Mercadeo. Series de Precios 1984-1985. Boletín no.14. pp.151-154. Es., Il.

Cassava. Prices. Statistical data. Consumption. Colombia.

The av. wholesale price of cassava var. Chirosa Armenia is briefly analyzed for the years 1984 and 1985 in the main Colombian consumption centers (Bogotá, Cali, and Medellín). Speculation with cassava caused significant price increases, especially from Oct. 1984 through April 1985. Figures are given in table and graphic form per city and per month. Wholesale price forecasts for 1986 are also given in table and graphic form per city and per month. (CIAT)

0559

27684 FEDERACION NACIONAL DE CAFETEROS DE COLOMBIA. 1985. Yuca Llanera. (Cassava variety Llanera). In _____. Productos agrícolas perecederos: bases de análisis, proyecciones 1986. Bogotá, Departamento de Mercadeo. Series de Precios 1984-1985. Boletín no.14. pp.155-157. Es., Il.

Cassava. Prices. Statistical data. Consumption. Colombia.

The av. wholesale price of cassava var. Llanera in the market is briefly analyzed for the years 1984 and 1985 in its main Colombian consumption center (Bogotá). Llanera prices are 55 percent lower than those of var. Chirosa Armenia, discouraging its cultivation; no Llanera-type cassava was received in the wholesale center of Corabastos in Bogotá in late 1985. Figures are provided in graphic and table form per month. (CIAT)

0560

28565 FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS. 1983. Cassava. FAO Production Yearbook 37:128-129. En., Fr., Es.

Cassava. Statistical data. Production. Yields. Africa. America. Asia. Oceania.

Data are included on area (ha), yield (kg/ha), and production (MT) of cassava for the different countries and continents during the period 1974-76 and for each year of the period 1981-83. (CIAT)

0561

28386 FULANI, I.B. 1981. Kwara State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.152-157. En.

Cassava. Cassava programs. Maize. Herbicides. Seed. Intercropping. Propagation. Adaptation. Cultivars. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Kwara, Nigeria, is presented. The cassava/maize program is briefly discussed. Field trials were carried out at 11 sites in 1980 and seed multiplication was carried out with a no. of cassava cv. in Ajasse. A total of 257 bundles of improved planting material were distributed. The cassava/maize trial plans for 1981 are indicated. (CIAT)

0562

28391 GIADOM, S.B. 1981. Rivers State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.185-193. En.

Cassava. Cassava programs. Maize. Cultivars. Clones. Productivity. Fertilizers. Adaptation. Technology transfer. Seed. Propagation. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Rivers, Nigeria, is presented. Yield results for the 1979 cassava var. and fertilizer trials are given. Cassava trials, training activities, field days, seed multiplication, and agroservice center development carried out in 1980 are also discussed. Constraints to planned research activities are indicated. (CIAT)

0563

28560 HANSEN, E. 1984. The food crisis in Ghana: national policies and organizations. Trenton, N.J., Africa Research and Publications Project. Working Papers Series no.10. 32p. En., 41 Ref.

Cassava. Cassava programs. Development. Developmental costs. Food security. History. Economics. Ghana.

In terms of the current structure of food production and distribution in Ghana, the evolution of its food policies under the colonial period, and the 1st and 2nd republics, is reviewed and the extent to which these policies respond to the food needs of the country is examined. Operation Feed Yourself, launched in 1972, is discussed and a general analysis is made of the food situation since independence to date. The policies of the 3rd republic, which restored civilian rule in 1979, encourage transnational corporation involvement in Ghanaian agriculture. Although the policy of emphasizing a few selected crops (maize, cassava, and rice) is considered sound, no innovations or policy initiatives have been introduced. A continuous and sustained attack on the food problem is recommended, with a comprehensive national food policy which will integrate and coordinate production, distribution, marketing, extension, storage, and research implemented. (CIAT)

0564

28113 HILLBERG, A.M. 1986. Limiting EC grain substitute imports: a simulation model of the West German manufactured feed economy. European Review of Agricultural Economics 13(1):43-56. En., Sum. En., 8 Ref. [Dept.

of Agricultural Economics, Purdue Univ., Krannert Building, West Lafayette, IN 47907, USA]

Cassava. Substitutes. Marketing. Prices. Trade. USA. Federal Republic of Germany.

EEC measures to limit grain substitute imports are evaluated using a simulation model of the Federal Republic of Germany northern and southern manufactured feed economy, including ingredient supply and compound feed demand functions. Results show that restrictions on cassava or maize gluten feed imports have only limited success in increasing feed grain demand by the Federal Republic of Germany feed manufacturers. The impact of changes in ration composition favoring grains are dampened by the accompanying higher finished ration costs. In contrast, lowered grain prices lead not so much to changed ration composition as to lowered finished ration prices and a resulting increased demand for the fine product. (AS)

0565

28518 IJIOMAH, M.I. 1982. Cassava and the green revolution: a case study in Imo State. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.152-159. En., 4 Ref.

Cassava. Processing. Socioeconomic aspects. Cassava programs. Gari. Nigeria.

The contribution of cassava in the form of gari to the green revolution of Nigeria, particularly in Imo State, is discussed. Cassava processing and marketing, pests and diseases, cassava production increase, and instability of cassava output are covered. (CIAT)

0566

28172 IKEORGU, J.E.G.; BARTLETT, C.D.S. 1979. What sort of improvements for cassava production do farmers need from NAFPP?. Umudike, Nigeria, National Root Crops Research Institute. 8p. En. Paper presented at the 3rd National Cassava Workshop, Umudike, Umuahia, 1979.

Cassava. Cassava programs. Development. Technology transfer. Socioeconomic aspects. Food security. Economics. Cultivation. Nigeria.

The preliminary results of a survey on farmers' needs for cassava production improvement in Imo State, Nigeria, are presented. The local farming systems are described regarding farming patterns, food supply, cropping calendar, and crops (cassava and yams). Resource constraints are discussed with emphasis on land, labor, and rainfall uncertainties. Staple food shortages, protein supplies, and cash supplies are also discussed. Improved, disease-resistant cassava cv. of both early and late maturing types, yielding well under low fertility conditions, should be made available to farmers; other desirable characteristics include high starch content, low MC, and storability. Research topics are recommended. (CIAT)

0567

28105 INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1983. Manioc (Manihot esculenta grantz). (Cassava). In _____. Rapport Annuel 1983. Rubona, Rwanda. pp.69-79. Fr.

Cassava. Cassava programs. Clones. Cassava mosaic virus. Productivity. Cercosporidium henningsii. Selection. Cultivars. Cultivation. Mononychellus tanajoa. Rwanda.

Results of research on cassava conducted during 1983 by the Institut des Sciences Agronomiques du Rwanda, at the Karama, Rubona, and Mutara exptl. stations, are presented. Work was carried out in nurseries, clonal evaluation trials, collection of var., selection and yield trials, cultural practice trials, collaborative projects, rapid multiplication, and multiplication and dissemination of cassava materials. Regarding the nurseries, mosaic is the most harmful disease in Karama, bacteriosis was not observed, and Cercosporidium henningsii is becoming an economically important disease; furthermore, the green mite was observed in all materials. In the clonal evaluation trial, it was observed once more that both C. henningsii and the green mite are tending to grow in importance. Karama has 100 var. in its collection. In the selection trials, local var. Ntolili still ranks highest in yields, both at 12 and 18 mo.; once more, C. henningsii and green mite attacks were observed. In yield trials, var. Mulundi and Maguruyinkware (sweet) and Eala 07, Creolinha, and Ntolili Seed 16 (bitter) were outstanding. Finally, meristem culture is being used to propagate and disseminate the best cassava var. (CIAT)

0568

26800 JOHNSON, B.T.; KAWA, J.A. 1985. Roots, tubers and plantains production in Sierra Leone. In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.217-227. En., 5 Ref.

Cassava. Marketing. Processing. Postharvest losses. Socioeconomic aspects. Statistical data. Developmental research. Cassava programs. Sierra Leone.

The situation of root, tuber, and plantain crops in Sierra Leone is described. Only small quantities of these crops are produced (105,000 t cassava in 1983). Cassava is an important foodstuff, both its roots and leaves are eaten and it is considered a reserve food for its easy storage in the ground. Cassava is intercropped and planted after rice in shifting rotational cultivations; it is also grown in swampy areas. The marketing process and the most common processing equipment and techniques are described; technical and economic production constraints are discussed. Several research and extension institutions are engaged in promotion programs for these crops. Some improved cassava var. are ROCASS 1, 2, and 3 (Rokupr Rice Research Station) and the NUCASS series (Njala U. College). The performance of these improved var., compared with local ones, fosters the intensive cultivation of cassava all over the country. (CIAT)

0569

28316 KWATIA, J.T. 1985. Women and small-scale agro-processing industries. Ibadan, Nigeria, International Institute of Tropical Agriculture. 37p. En., Paper presented at Oyo State Co-operative Seminar Women and Youths: Potential Areas for Co-operative Movement Expansion.

Cassava. Development. Small-scale processing. Socioeconomic aspects. Technology transfer. Gari. Processing. Credit. Labor. Mechanization. Industrialization. Women. Cooperatives. Nigeria.

Women's participation in the informal sector of the economy is analyzed and an example of a survey among women involved in gari processing on a small-scale level is presented. Out of 40 women interviewed, 37.5 percent were gari producers involved in all 6 major processing stages (peeling and washing, grating, dehydration, sieving, drying, and frying). A breakdown of hours devoted to each stage is presented and the problems involved in the use of equipments, attitudes towards new tecnologies, and production problems are discussed. The solutions proposed by women are listed. Recommendations discussed relate to the organization of women in

cooperatives, credit facilities, supply of inputs, selective mechanization of processes, effective transportation and marketing systems, sociocultural redirection of society, and integration of activities of women-related agencies. (CIAT)

0570

29499 MARLOIE, M. 1987. Mandioca and Co: y vino la hora de los substitutos. (Cassava and Co: the hour of substitutes has come). El Correo de Solagral no.6:15-17. Es., 4 Ref., Il.

Cassava. Trade. Legal aspects. Substitutes. Feeds and feeding. Marketing. Socioeconomic aspects. France. Thailand.

Substitute products for cereals within the EEC are discussed, cassava being the most well-known. While in Holland cereals account for only 20 percent of the mixed animal feed rations, in France this figure is 50 percent. Based on the 1980 self-limitation agreement, cassava imports from Thailand are being reduced, while substitute product imports for the USA have increased. With the EEC's assistance, during 1980-83 (1st phase) Thailand started diversifying its agriculture with alternate crops, an innovation that associated co-development with an economic agreement; however, the outcome was not successful. A new agreement was negociated in 1986, in which the amount of imported cassava would be progressively reduced. Thailand's recent adhesion to GATT (General Agreement on Tariffs and Trade) forces the EEC to be more flexible. Since a Europe-Thailand exchange is to be maintained, a direct relationship between producers and European, North American, and Thai non-governmental organizations would be worthwhile. (CIAT)

0571

26798 MULINDAGABO, M.M.; ALVAREZ, M.N. 1985. La recherche et le developpement du programme national d'amelioration des plantes a racines et a tubercules amylaces au Rwanda. (Research and development of the national root and tuber improvement program in Rwanda). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.182-195. Fr., Sum. Fr., 3 Ref., Il.

Cassava. Cultivars. Root productivity. Mononychellus tanajoa. Cassava programs. Developmental research. Phenacoccus manihoti. Bacterioses. Cassava mosaic virus. Cercosporidium henningsii. Rwanda.

The situation of root and tuber crops, especially cassava and sweet potato, in Rwanda is analyzed and current research projects are described. The Institut des Sciences Agronomiques du Rwanda is engaged in an interinstitutional breeding program for these crops, and is also the headquarters for a program at the macroregional level. Major constraints of cassava cultivation are low yields, late-maturing var. (9-12 and 18-24 mo. for sweet and bitter var., resp.), pests (Mononychellus tanajoa, Phenacoccus manihoti) and diseases (mosaic, bacterioses, cercosporioses), and deficient transportation facilities of products, and poor quality of by-products. (CIAT)

0572

28520 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. Anambra State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.179-193. En.

Cassava. Socioeconomic aspects. Cassava programs. Nigeria.

The 1981-82 report of the National Accelerated Food Production Programme (NAFPP) in Anambra State, Nigeria, is presented. Activities reported on cassava are related to training and seed multiplication. Problems faced during the execution of the NAFPP program are also indicated. (CIAT)

0573

28521 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. Cross River State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.184-188. En.

Cassava. Cultivars. Productivity. Cassava programs. Technology transfer. Maize. Intercropping. Nigeria.

A brief report of cassava research activit. conducted in Cross River State, Nigeria, in 1981-82, is presented. D. of cassava yields achieved in 61 production trials conducted in 1980-81 are given. In 1981-82, 66 production plots and 25 maize/cassava plots were established. Mass adoption of NAFPP improved technology and improved cassava var. has occurred. Training and seed multiplication activities are also reported briefly. Problems faced during the execution of the NAFPP (National Accelerated Food Production Program) are poor transportation facilities, inadequate use of staff, lack of inputs, and lack of incentives to farmers. Trials proposed for 1982-83 are listed. (CIAT)

0574

28522 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. Imo State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.189-196. En.

Cassava. Cassava programs. Socioeconomic aspects. Technology transfer. Fertilizers. Cultivars. Productivity. Nigeria.

Cassava research activities conducted in Imo State, Nigeria, in 1981-82 are reported. Yield results are given for the 1980 cassava var. and fertilizer minikit trials and demonstration plots. Brief notes are given on cassava trials established during the period, technology adoption, farmer cooperatives, seed multiplication, training, field days, and problems faced during the execution of the NAFPP (National Accelerated Food Production Programme). (CIAT)

0575

28523 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. Kaduna State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.197-201. En.

Cassava. Cassava programs. Socioeconomic aspects. Technology transfer. Nigeria.

Cassava research activities conducted in Kaduna State, Nigeria, in 1981-82 are reported. Brief notes are given on cassava trials established during the period, seed multiplication, training, field days, inspection tours, and meetings. The major problem faced during the execution of the NAFPP (National Accelerated Food Production Programme) was the noravailability of planting material. Varietal (8) and fertilizer (4) trials are proposed for 1982. (CIAT)

0576

28524 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. Kwara State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.202-2042. En.

Cassava. Cassava programs. Socioeconomic aspects. Technology transfer. Nigeria.

Cassava program activities in Kwara State, Nigeria, in 1981-82 are reported. Brief notes are given on cassava trials established during the period, seed multiplication, training, and field days. Staffing and financing were major problems faced during the execution of the NAFPP (National Accelerated Food Production Programme). Trials proposed for 1982-83 are listed. (CIAT)

0577

28525 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. Lagos State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.205-210. En.

Cassava. Cassava programs. Socioeconomic aspects. Technology transfer. Cultivars. Productivity. Nigeria.

Cassava activities of the NAFPP (National Accelerated Food Production Programme) in Lagos State, Nigeria, in 1981-82 are reported. Results are given for the 1980 cassava var. and demonstration trials. Brief notes are given on cassava trials established during the period, training, meetings, the green revolution coordinating committee, land clearing, and field days. Problems faced during the execution of the NAFPP are briefly discussed and trials proposed for 1982-83 are listed. (CIAT)

0578

28526 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. Ogun State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.211-215. En.

Cassava. Cassava programs. Socioeconomic aspects. Technology transfer. Productivity. Cultivars. Nigeria.

Activities of the NAFPP (National Accelerated Food Production Programme) in cassava in Ogun State, Nigeria, in 1981-82 are reported. Results are given for the 1980 cassava var. and fertilizer trials. Brief notes are given on cassava trials established during the period, training, field days, and seed multiplication. Problems faced during the execution of the NAFPP were insufficient supply of cassava cuttings and shortage of staff. Trials proposed for 1982-83 are listed. (CIAT)

0579

28527 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. Ondo State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.216-221. En.

Cassava. Cassava programs. Socioeconomic aspects. Technology transfer. Cultivars. Productivity. Nigeria.

Activities of the NAFPP (National Accelerated Food Production Programme) in cassava in Ondo State, Nigeria, in 1981-82 are reported. Results are given for the 1980 var., fertilizer, and demonstration trials. Brief notes are given on cassava trials established during the period and seed multiplication. Problems faced during the execution of the NAFPP are discussed, and suggestions are made for trial data record keeping. (CIAT)

0580

28501 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. 247p. En.

Cassava. Development. Socioeconomic aspects. Technology transfer. Cultivars. Soil fertility. Plant fertility. Productivity. Pest control. Pest damage. Experiment design. Biological control. Weeding. Phenacoccus manihoti. Mononychellus tanajoa. Adaptation. N. P. K. Ca. Nigeria.

The papers presented at the 6th NAFPP (National Accelerated Food Production Programme) National Cassava Workshop (Umudike, Nigeria), held on Feb. 21-26, 1982, are compiled. In addition to the 10 state annual reports, specific papers deal with topics regarding farmer adoption of cassava/maize technology, increased cassava production, agronomic studies regarding weed and pest control (especially Phenacoccus manihoti and Mononychellus tanajoa), and fertilization. Individual papers are recorded in this publication under the following consecutive no.: 0412 0419 0464 0466 0472 0474 0484 0486 0541 0543 0551 0552 0554 0565 0572 0573 0574 0575 0576 0577 0578 0579 0581 0582 0599 0600 0606 0629. (CIAT)

0581

28528 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. Rivers State: cassava/maize. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.222-228. En.

Cassava. Cassava programs. Socioeconomic aspects. Technology transfer. Cultivars. Productivity. Plant fertility. Soil fertility. Maize. Adaptation. Nigeria.

The activities of the NAFPP (National Accelerated Food Production Programme) in cassava in Rivers State, Nigeria, in 1980-81 are reported. Results are given for the 1980 cassava var. and fertilizer trials; av. yields of top cassava var. 30572, 30211, 30555, 4488, and 30395 were 28.4, 27.1, 27.0, 26.0, and 24.0 t/ha, resp. Brief notes are given on the cassava trials established during the period, training, meetings, field days and field trips, and seed multiplication. Problems faced during the execution of the NAFPP were the lack of staffing, transportation means, and funds. Trials proposed for 1982-83 are listed. (CIAT)

0582

28529 NAFPP NATIONAL CASSAVA WORKSHOP, 6th., UMUDIKE, NIGERIA. 1982. State NAFPP 1982 programme of work and cassava/maize variety selections. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.244-246. En.

Cassava. Cultivars. Intercropping. Maize. Adaptation. Cassava programs. Nigeria.

The proposed work program of the NAFPP (National Accelerated Food Production Programme) during 1982 is presented in table form; the cassava/maize var. selections for each type of trial are also listed. Cassava var., fertilizer, demonstration, and production trials are indicated for each of 13 Nigerian states and 2 institutions, in addition to economic studies and seed multiplication activities. (CIAT)

0583

28369 NAFPP NATIONAL CASSAVA WORKSHOP, 5th., UMUDIKE, NIGERIA. 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. 200p. En., Il.

Cassava. Cassava programs. Technology transfer. Development. Fertilizers. Seed. Cultivars. Clones. Maize. Intercropping. Processing. Nutrient uptake. Pest control. Nigeria.

The papers presented at the 5th NAFPP (National Accelerated Food Production Programme) National Cassava Workshop (Umudike, Nigeria), held on Feb. 9-13, 1981, are compiled. In addition to 13 Nigerian state annual reports, specific topics dealt with are as follows: a delivery system for cassava, improvement of food production systems through NAFPP workshops, recommendations on cassava/maize production, commercial-scale adaptation of the rapid multiplication technique, chemical control of Phenacoccus manihoti and its effects on yields, cassava variety performance, a case study on fertilizer demand, cassava/maize response to fertilization, factors affecting fertilizer efficiency, and progress and problems of cassava multiplication. Individual papers are recorded in this publication under the following consecutive no.: 0409 0417 0428 0453 0467 0536 0540 0542 0550 0553 0555 0557 0561 0562 0601 0602 0603 0604 0608 0614 0616 0625. (CIAT)

0584

28360 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Annual Report 1979/80 Lagos State. In _____ . Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.156-164. En.

Cassava. Cassava programs. Cultivars. Productivity. Socioeconomic aspects. Technology transfer. Fertilizers. Intercropping. Maize. Nigeria.

The 1979/80 annual report of activities of the NAFPP (National Accelerated Food Production Programme) regarding cassava in Lagos State, Nigeria, is presented. Results of 1978/79 fertilizer trials, cassava/maize intercropping trials, demonstration trials, multiplication plots, and field days are given. Cassava var. TMX 30572 gave highest yields in the intercropping trials. Training activities are mentioned and diverse administrative issues are discussed. A total of 8110 improved cassava cuttings were distributed. (CIAT)

0585

28348 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Cassava in the delta area of Bendel State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.43-46. En.

Cassava. Production. Technology transfer. Planting. Nigeria.

Cassava production practices are described and production problems and suggested solutions are discussed for Bendel State, Nigeria, where cassava is the main food crop and the most important cash crop. The package of cassava production practices recommended by the NAFPP (National Accelerated Food Production Programme) is indicated; problems presented by its adoption in the region are analyzed. Ridging should be eliminated from the package and the single application of only 1 compound fertilizer is recommended. (CIAT)

0586

28356 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Cassava report: Benue State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.136-138. En.

Cassava. Cassava programs. Cultivars. Cassava African mosaic virus. Cassava bacterial blight. Nigeria.

Cassava research activities conducted in Benue State, Nigeria, in 1979-80 are briefly reported. Var. 30211, 30572, 3055, and 1525 were included in minikit trials. CAMD and CBB were reported. (CIAT)

0587

28363 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Co-operation programme development of cassava and sweet potatoes (Agbarho). In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.175-180. En.

Cassava. Cassava programs. Bacterioses. Cultivars. Productivity. Planting. Nigeria.

A cooperation program to develop cassava and sweet potato technology in Agbarho (Bendel State, Nigeria) is briefly described. Promising high yielding var. with resistance to CBB and CAMD have been identified. Improved production technology related to the use of chemical inputs was released. Data is given on cassava var. distributed and the resp. no. of cuttings provided. (CIAT)

0588

20357 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Cross River State report. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.139-146. En.

Cassava. Cassava programs. Fertilizers. Cultivars. Intercropping. Maize. Productivity. Nigeria.

Cassava research activities conducted in Cross River State, Nigeria, in 1979-80 are briefly reported. Cassava var. 30555 and 30395 showed the best performance in intercropping trials with maize in Akamkpa in the 1978-79 trials; var. 30211 performed best in Uyo and Ikom, 60506 in Abak, and 30395 in Oron and Ikot Ekpene. Results from the cassava/maize demonstration trials for the same period indicate that farmers accepted the improved package practices. In 1979-80, 9 cassava/maize minikit trials and 2 field days were organized. NAFPP (National Accelerated Food Production Programme) administrative issues, problems, and solutions are discussed. (CIAT)

0589

28358 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Imo State report. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.147-151. En.

Cassava. Cassava programs. Cultivars. Technology transfer. Fertilizers. Productivity. Nigeria.

Cassava research activities conducted in Imo State, Nigeria, in 1979-80 are briefly reported. Cultural practices adopted (demonstration of improved package; var. and fertilizer trials) are mentioned. Var. TMX 30211, TMX 30555, and TMX 30395 were superior in performance. Shortage of inputs and lack of financial support were major constraints to the execution of the NAFPP (National Accelerated Food Production Programme). (CIAT)

0590

28355 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. National Accelerated Food Production Project (NAFPP) 1979/80 Annual Report for Anambra State. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.120-135. En.

Cassava. Cassava programs. Intercropping. Cultivars. Maize. Rice. Productivity. Fertilizers. Technology transfer. Nigeria.

The 1979-80 report of the National Accelerated Food Production Project (NAFPP) in Anambra State, Nigeria, is presented. Among the activities conducted are a national cassava workshop and a short maize/cassava and

rice training course. Results of cassava and cassava/maize var. and fertilizer minikit trials, demonstrations, and production trials are given. Other NAFPP administrative and research-related topics are reported. (CIAT)

0591

28362 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. National Accelerated Food Production Project: Rivers State, 1979/80 report. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.168-174. En.

Cassava. Cassava programs. Maize. Intercropping. Cultivars. Technology transfer. Productivity. Fertilizers. Nigeria.

The 1979/80 annual report of activities of the NAFPP (National Accelerated Food Production Programme) regarding cassava in Rivers State, Nigeria, is presented. Armyworm attack and root rots were reported. Results of the 1978/79 var. minikit trials are given. Cassava var. planted in the 1979/80 var. trials are indicated. Field day observations, training and seed multiplication activities are mentioned. Constraints to the execution of 1979 plans are listed. (CIAT)

0592

28343 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. 224p. En., Il.

Cassava. Cassava programs. Socioeconomic aspects. Technology transfer. Cultivars. Soil fertility. Plant fertility. Productivity. Pest control. Pest damage. Experiment design. Biological control. Weeding. Phenacoccus manihoti. Mononychellus tanajoa. Clones. Planting. Nutritional requirements. Nigeria.

The proceedings of the 4th NAFPP (National Accelerated Food Production Programme) National Cassava Workshop, held in Nigeria in 1980, are presented. The 25 technical papers presented include Nigerian institutional and state reports and results of studies on the control of Phenacoccus manihoti, minikit trials, innovations for cassava production in a heavily populated area of eastern Nigeria, technology transfer, mechanization, agricultural credit, cassava cultural practices, nutrient demands, soil management, cooperative programs, improved clone selection, farmer adoption of technology packages, and var. Individual papers are recorded in this publication under the following consecutive no.: 0399 0416 0421 0424 0430 0431 0438 0468 0501 0545 0556 0584 0585 0586 0587 0588 0589 0590 0591 0593 0594 0595 0596 0597 0605. (CIAT)

0593

28368 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Proposed activities 1980/81. In _____. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.205-216. En.

Cassava. Cassava programs. Development. Fertilizers. Maize. Intercropping. Propagation. Nigeria.

The objectives, procedures, locations, duration, and data to be recorded for the different cassava research projects of the NAFPP (National Accelerated Food Production Programme) in 1980-81 are presented. The projects include a herbicide pre-minikit trial, a mixed cropping pre-minikit trial, a cassava var. minikit trial, fertilizer tests, cassava/maize demonstrations, economic studies of cassava/maize demonstration/production trials, and cassava multiplication. (CIAT)

0594

28359 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Report on NAFPP cassava/maize programme in Kwara State. In _____. Proceedings. Umudike, National Root Crops Research Institute, National Cassava Centre. pp.152-155. En.

Cassava. Cassava programs. Maize. Intercropping. Herbicides. Propagation. Fertilizers. N. P. K. S. Nigeria.

Cassava/maize program activities in Kwara State, Nigeria, in 1979 are reported. Preliminary results of herbicide trials indicate the need for 1 hand weeding in chemically treated fields. In fertilizer trials, cassava responded more to NKS fertilization than to NPKS, PKS, NPK, and NPS. Data are provided on cassava multiplication and plans for 1980. (CIAT)

0595

28366 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Resolutions made at the 4th NAFPP National Cassava Workshop. In _____. Proceedings. Umudike, National Root Crops Research Institute, National Cassava Centre. pp.197-199. En.

Cassava. Cassava programs. Development. Nigeria.

The identified constraints and the recommendations made by a 12-member committee, participating in the 4th National Cassava Workshop of the National Root Crops Research Institute (Nigeria) in 1980, are presented. Recommendations relate to adequate funding, staffing, and training of the institutions involved in cassava research/extension activities, and to providing farmers with timely credit, inputs, and marketing facilities. (CIAT)

0596

28365 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. A socio-economic survey of farmer-adoption of National Accelerated Food Production Project's (NAFPP) package recommendations for cassava/maize production in Nigeria; survey plan. In _____. Proceedings. Umudike, National Root Crops Research Institute, National Cassava Centre. pp.185-196. En.

Cassava. Technology transfer. Maize. Intercropping. Experiment design. Socioeconomic aspects. Nigeria.

The objectives, justification, coverage, time reference, and sample design of a socioeconomic survey of farmer adoption in Nigeria of the technology package for cassava/maize, developed by the National Accelerated Food Production Project, are described. The questionnaire to be used is included. (CIAT)

0597

28361 NAFPP NATIONAL CASSAVA WORKSHOP, 4th., UMUDIKE, NIGERIA. 1980. Up-to-date report on cassava variety/maize minikit trial 1979/80: Ondo State. In _____. Proceedings. Umudike, National Root Crops Research Institute, National Cassava Centre. pp.165-167. En.

Cassava. Cassava programs. Cultivars. Maize. Intercropping. Nigeria.

An updated report of activities of the cassava/maize minikit trials in Ondo State, Nigeria, in 1979-80 is presented. Data are given on cassava var. distribution to different sites and condition of planted plots to date. (CIAT)

0598

26802 NAKU, M.; MAHUNGU, N.M.; SAMBA, M.T.A.; NTUMBA, N.; BAUWE, N.B. 1985. Le cas du Zaire. (The case of Zaire). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.248-259. Fr., 3 Ref.

Cassava. Production. Marketing. Processing. Prices. Legal aspects. Bacterioses. Socioeconomic aspects. Cassava programs. Developmental research. Phenacoccus manihoti. Mononychellus tanajoa. Cassava mosaic virus. Zaire.

The situation of cassava and other starchy crops in Zaire is described. In 1974, the Programme National de Manioc was created for the development of cassava production (2,086,400 ha planted and 14,273,100 t/yr) and which also promotes the use of improved var., the identification of diseases and pests, and the use of improved agricultural practices. The past and present commercialization systems are described. In 1984, 900,000 t cassava chips were commercialized. The main constraints to production and cultivation are discussed, among them low soil fertility, influence of clans on land tenure patterns, ancestral crop schedules, division of labor by sex, and absence of research. (CIAT)

0599

28516 OBIBUAKU, L.O.; UZUEGBUNAM, C.O. 1982. The effect of the National Accelerated Food Production Programme (NAFPP) on cassava production in Anambra State. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.134-147. En., 16 Ref.

Cassava. Production. Technology transfer. Socioeconomic aspects. Development. Productivity. Marketing. Nigeria.

To determine the impact of the NAFPP (National Accelerated Food Production Programme) in the state of Anambra, Nigeria, 2 groups of cassava farmers (100 each of NAFPP participants and nonparticipants) from 5 agricultural zones of the region were surveyed. Twenty agricultural assistants also provided information on the program. Cassava yields of both groups were compared with those obtained in NAFPP demonstration plots. Av. yields of NAFPP participants almost doubled those of nonparticipants (10.92 vs. 6.01 t/ha, resp.). On the other hand, NAFPP participants obtained approx. 2/3 of potential yields attainable according to demonstration plots, suggesting that greater efforts are required to aid farmers in increasing their yields. The NAFPP has made significant contributions to increase cassava yields, but the goal of increasing yields 3-fold or 4-fold, as proposed, has not been achieved. The main constraints to achieve these goals are discussed, namely, poor financing, marketing problems, and inadequate staffing. Recommendations to overcome these problems are presented. (CIAT)

0600

28504 ODURUKWE, S.O. 1982. Review of the National Cassava Centre 1981. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.24-35. En.

Cassava. Development. Productivity. Cultivars. Intercropping. Maize. Fertilizers. N. P. K. Mg. Adaptation. Technology transfer. Nigeria.

Activities carried out during 1981 at the National Cassava Center (Nigeria) are reported. Results are given for the herbicide pre-minikit trials, mixed

cropping pre-minikit trials (cassava/maize + melon), var. minikit trials, and fertilizer tests. Cassava var. TMS 30572 proved superior with an av. yield of 22.9 t/ha across locations compared with 15.1 t/ha for the best local var. NPK + Mg was the best treatment giving an av. of 13.8 t/ha. Other activities included cassava/maize demonstrations, economic studies on the adoption of improved technology, seed multiplication, training, workshops, and exhibitions. (CIAT)

0601

28372 ODURUKWE, S.O. 1981. Review of N.A.F.P.P. National Cassava Centre 1980. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.13-28. En.

Cassava. Cassava programs. Cultivars. Productivity. Technology transfer. Socioeconomic aspects. Fertilizers. Pest damage. Intercropping. Adaptation. Maize. Selection. Phenacoccus manihoti. Mononychellus tanajoa. Nigeria.

The results of cassava research activities conducted by the NAFPP (National Accelerated Food Production Programme) National Cassava Centre (Nigeria) in 1980 are presented. These included var., herbicide, and mixed cropping fertilization pre-minikit trials, var. and fertilizer minikit trials, cassava/maize demonstrations, cassava multiplication, and economic/feasibility studies. Administrative problems are discussed. Major problems were Phenacoccus manihoti and Mononychellus tanajoa infestations. (CIAT)

0602

28380 OGBODU, B.C. 1981. Anambra State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.110-116. En.

Cassava. Cassava programs. Cultivars. Productivity. Technology transfer. Fertilizers. Intercropping. Maize. Nigeria.

The 1980 cassava annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Anambra, Nigeria, is presented. Proposed and ongoing cassava trials (var., fertilizer, maize/cassava, production) are indicated; yields of the 1979 cassava demonstration plots are given. Other activities reported include training, seed multiplication, agroservice centers, and community farm center establishment. Problems found when executing the 1980 program are listed. (CIAT)

0603

28381 OGIO-OKIRIKA, J.A. 1981. Bendel State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.117-129. En.

Cassava. Cassava programs. Cultivars. Technology transfer. Productivity. Fertilizers. Propagation. Seed. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Bendel, Nigeria, is presented. Data from the cassava var. minikit trial, demonstration plots, and the fertilizer minikit trial are reported. Other activities carried out were economic studies on production, agroservice center development, and seed multiplication. Problems encountered when executing the plans for 1980 are outlined. Adoption of improved technology by farmers, especially regarding cassava var., is briefly discussed. A note on an exhibition of cassava products held in Benin City in Nov. 1980 is included. The trials proposed for 1981 are listed. (CIAT)

0604

28385 OJO, P.O. 1981. Kaduna State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.150-151. En.

Cassava. Cassava programs. Cultivars. Adaptation. Cassava African mosaic virus. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Kaduna, Nigeria, is presented. Trials were conducted with bitter cassava var. only. CAMD was observed throughout all sites, var. TMX 60506, 30211, and 30568 being severely affected. The lack of qualified personnel and the shortage of funds have been major constraints. (CIAT)

0605

28349 OKEREKE, H.E. 1980. Problems of technology transfer to Nigerian farmers. In NAFPP National Cassava Workshop, 4th., Umudike, Nigeria, 1980. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.47-59. En., Il.

Cassava. Technology transfer. Nigeria.

A comprehensive analysis of the constraints to cassava technology transfer, derived from the Nigerian agricultural system components (research, extension, and the farmer), is presented. A series of solutions and recommendations to these problems is also included. Research efforts should: (1) study the farmer and his environment as a basis for formulating relevant research projects; (2) adopt a systems approach to produce packages of appropriate technology; (3) see that research results are transmitted to farmers. Extension efforts should be integrated to research efforts and appropriate communication means should be developed. Farmer problems, on the other hand, are social problems that should be tackled through land reform, credits, education, and technical assistance. The role of the NAFPP (National Accelerated Food Production Programme) is discussed within this context. (CIAT)

0606

28517 OYOLU, C. 1982. Assessment of NAFPP with special reference to the eastern states of Nigeria. In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.148-151. En.

Cassava. Development. Technology transfer. Food security. Nigeria.

The effectiveness of the NAFPP (National Accelerated Food Production Programme) in the eastern states of Nigeria is discussed. Questions are raised regarding the systems approach used by the NAFPP in the region, the technological packages transferred to farms since 1973, and the impact on food productivity and supply in the country, and especially in the eastern states. (CIAT)

0607

26308 ROMANOFF, S. 1986. Beneficiarios de las plantas secadoras de yuca. (Beneficiaries of the cassava drying plants). In Best, R.; Ospina, P., B., comp. El desarrollo agro-industrial del cultivo de la yuca en la Costa Atlántica de Colombia. Cuarto informe sobre las investigaciones realizadas en apoyo al establecimiento de las plantas de secado natural de yuca período julio 1984-junio 1985. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Cooperativo DRI-CIAT. v.2, pp.15-29. Es., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Cassava. Cassava programs. Socioeconomic aspects. Mechanization. Drying. Costs. Factories. Statistical data. Land tenure. Developmental research. Colombia.

Sales receipts and surveys carried out in 20 cassava drying plants in operation in 1984-85 were used to determine the no. of beneficiaries of the project, their socioeconomic characteristics, and the distribution of benefits, among other data. The total no. of beneficiaries was estimated to be 1158. Among members, the greatest amount of gross profit of the plants was for those with less than 5 ha; of the mean benefits, the greatest amount was for those members with 6-12 ha. A significant no. of middlemen and large-scale farmers were nonmember beneficiaries, indicating the importance of locating the plants in areas with a large no. of small farms. In general, members with less than 3 ha increased their cultivated area, while those with more than 3 ha reduced the area. (CIAT)

0608

28388 SAKA, A.A. 1981. Ogun State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.167-168. En.

Cassava. Cassava programs. Cultivars. Adaptation. Fertilizers. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Ogun, Nigeria, is presented. Established cassava trials are briefly discussed; the shortage of adequate cuttings may have affected yield figures. For 1981, plans include 24 var. trials and 44 fertilizer trials. (CIAT)

0609

27674 SAKUBU, J. 1985. Manioc (Manihot esculenta). (Cassava). In Institut des Sciences Agronomiques du Burundi. Rapport des Recherches Agronomiques 1985. Bujumbura, Burundi. pp.44-46. Fr.

Cassava. Development. Protein enrichment. Postharvest technology. Cultivars. Cassava programs. Technology transfer. Adaptation. Burundi.

The main objectives of the cassava program of the Institut des Sciences Agronomiques du Burundi during 1985 are given. The ongoing projects dealing with protein enrichment of cassava, postharvest transformations, and selection trials are also mentioned. In a cassava harvest trial during 2 periods, in localities at different alt., tuberization was confirmed to increase to a lesser extent between the 1st and 2nd harvest dates in low-alt. regions than in medium-alt. or high-alt. regions. Var. Criolinha, Bitamisi, Zayimeti, and Mpambayabashengera have been nominated for release. (CIAT)

0610

27675 SAKUBU, J.; BAERT, T.; JANSSENS, M. 1984. Manioc (Manihot esculenta). (Cassava). In Institut des Sciences Agronomiques du Burundi. Rapport des Recherches Agronomiques 1984. Bujumbura, Burundi. pp.43-47. Fr.

Cassava. Cassava programs. Cultivars. Productivity. Technology transfer. Adaptation. Selection. Clones. Burundi.

The main objectives of the cassava program of the Institut des Sciences Agronomiques du Burundi during 1984 are presented. Two ongoing projects are mentioned: (1) pedigree selection based on sweet taste, long conservation in the soil, productivity, tolerance to the green mite, and adaptation to high alt.; (2) cassava protein enrichment. Also, the objectives of a survey on cassava cropping are summarized. Finally, results of screening

and yield trials, carried out in localities at different alt. with local and Nigerian var., are included. In the screening trial, the local var. Zayimeti and Sagarara performed better in medium-alt. to low-alt. zones while Sagarara and Ruboan were the most productive in high-alt. zones; moreover, yields decreased notably with alt. In the yield trials, it was observed that as the alt. increases, earliness and yield decrease; for zones between 800-1300 m, the yield increase rate between 15-18 mo. is very low and for zones at 1800 m, the difference in yield between mo. 18 and 21 is notorious. (CIAT)

0611

27692 SECRETARIA DE AGRICULTURA DE ANTIOQUIA. COLOMBIA. 1985. Tuberculos: yuca. (Tubers: cassava). Antioquia Agropecuario no.2:22,24. Es.

Cassava. Production. Prices. Consumption. Cultivars. Statistical analysis. Colombia.

Cassava production, prices, and credit in Antioquia, Colombia, during 1985 are briefly analyzed. A total of 4620 ha were planted. Cassava var. Chirosa and Armenia, produced in other departments, are preferred in Medellin, the main consumption center of Antioquia; these var. are therefore being promoted. Producer prices during the 2nd and 3rd quarters of the year increased 600 percent compared with those for 1984; hopefully this will stimulate 1986 cassava plantings. From 1984 to 1985 credits for cassava production increased 100 percent in value and 75 percent in area benefitted. Favorable projections for cassava in Antioquia are foreseen for 1986. Producer, wholesale, and retail prices of cassava on a monthly basis during the 2nd semester of 1984 and 1985 are given in table form. (CIAT)

0612

28532 SILVEIRA, S.B.; CEREDA, M.P. 1985. A fécula de mandioca (polvilho doce): padroes e qualidade para mercado interno e exportacao. (Cassava starch: standards and quality for domestic market and for export). Ilha Solteira-SP, Brasil, Universidade Estadual de Sao Paulo. 21p. Pt., Sum. Pt., En., 22 Ref. [Univ. Estadual de Sao Paulo, Campus de Ilha Solteira, Caixa Postal 31, 15.378 Ilha Solteira-SP, Brasil]

Cassava. Cassava starch. Trade. Consumption. Brazil.

Basic information on the quality and quality standards of cassava starch used for the Brazilian domestic market and for export is given based on a literature review and on data collected with a questionnaire sent to 70 cassava by-product industries, mainly in south and SE Brazil. The participation of Brazil in the international market is analyzed as well as problems related to starch quality and uniformity. Quality parameters for starch trade that must be achieved and maintained by the manufacturers are discussed in view of the standards designed for exportable products by the Banco do Brazil and of other available standards and specifications. (CIAT)

0613

29001 SUTARNO, H.; ROEMANTYO, H.; SUPARDIJONO, E.K. 1985. Tanaman berperawakan rendah dan membelit di pekarangan teluknaga, citeureup dan pacet. (Plants with low statures in kitchen gardens in Teluknaga, Citeureup, and Pacet). Berita Biologi 3(2):49-54. In., Sum. En., In., 1 Ref.

Cassava. Cassava programs. Vegetable crops. Indonesia.

Studies on kitchen garden crops of lower stature (3 m), including climbing plants, were carried out in Teluknaga (0-10 m), Citeureup (200-500 m), Pacet (600-1400 m) to obtain information on species variation, cultivation,

and utilization. There were 14, 36, and 37 different crop species, resp., in these 3 districts. Cassava was among the most common crops. Due to the relatively good soil and climatic conditions and the agricultural knowledge of the inhabitants, the home gardens in Citeureup and Pacet were fully utilized for agriculture. (AS (extract))

0614

28383 UDOH, F.D. 1981. Cross River State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute, National Cassava Centre. pp.133-138. En.

Cassava. Cassava programs. Cultivars. Seed. Maize. Socioeconomic aspects. Adaptation. Productivity. Propagation. Intercropping. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Cross River, Nigeria, is presented. During 1979-80, cassava var. 30395 outyielded var. 30211, 30555, and 60506 with an av. yield of 27.5 t/ha compared with 18.5 t/ha for the local control. Results of maize/cassava trials, field days, training, seed multiplication, and agroservice development during 1980 are given. Constraints to the 1980 plans are briefly discussed and trials proposed for 1981 are listed. (CIAT)

0615

28185 UNAMMA, R.P.A.; ODURUKWE, S.O.; OKEREKE, H.E.; ENE, L.S.O.; OKOLI, O.O. 1985. Farming systems in Nigeria: report of the bench-mark survey of the farming systems of the eastern agricultural zone of Nigeria. Umudike, Umuaiha, Nigeria, The Agricultural Extension & Research Liaison Services, National Root Crops Research Institute. 158p. En., Sum. En., 18 Ref., Il.

Cassava. Development. Socioeconomic aspects. Production. Technology transfer. Marketing. Statistical data. Erosion. Productivity. Cultivars. Intercropping. Maize. Yams. Legume crops. Foofoo. Gari. Nigeria.

Results of a survey conducted in eastern Nigeria on farming systems are given in detail. Information is provided on what farmers do, when, how, and why, as well as on production constraints. Cassava, a major food crop (93 percent), appears as a component of 12 of the 21 most common mixed cropping systems in all states of the region. It is normally planted in April, but planting time could be extended to Sept. Data on cassava marketed, consumed, and stored in the region in 1981 are given. Cassava and yams rendered the highest farm revenues that year. Fufu and gari are the main processed cassava products. Recommendations aimed at researchers and policy makers are presented. (CIAT)

0616

28382 USAKA, A.H. 1981. Benue State. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.130-132. En.

Cassava. Development. Socioeconomic aspects. Technology transfer. Uses. Propagation. Seed. Cassava African mosaic virus. Xanthomonas campestris pv. manihotis. Phenacoccus manihoti. Nigeria.

The 1980 annual report of the NAFPP (National Accelerated Food Production Programme) in the state of Benue, Nigeria, is presented. Brief notes are given on minikit trials, field days, training activities, seed multiplication, cassava uses, and trial distribution in 1980-81. CAMD, Phenacoccus manihoti, and CBB were observed attacking most trial plots. The trials proposed for 1981-82 are listed. (CIAT)

0617

25782 VILLANUEVA, N.R. 1981. Root crops -- current programs and development needs. In Anniversary and Annual Convention of the Pest Control Council of the Philippines, 11th., College, Laguna, 1980. Proceedings. College, Laguna, Pest Control Council of the Philippines. pp.63-73. En.

Cassava. Cassava programs. Root productivity. Production. Starch productivity. Cultivation. Philippines.

An overall description of current programs and development needs of root crops, including cassava, in the Philippines is presented. General aspects cover economic importance of root crops as food, feed, and industrial products, and current production systems and problems. The current research program regarding priorities, activities, and production expansion is described. Research recommendations are given. (CIAT)

0618

26781 WORKSHOP ON PRODUCTION AND MARKETING CONSTRAINTS ON ROOTS, TUBERS AND PLANTAINS IN AFRICA, KINSHASA, ZAIRE. 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.1, 104p. v.2, 270p. En., Fr., Il.

Cassava. Socioeconomic aspects. Production. Marketing. Costs. Prices. Consumption. Labor. Cultivation systems. Intercropping. Malnutrition. Secondary crops. Storage. Processing. Drying. Processed products. Statistical data. Cassava programs. Developmental research. Pests. Distribution. Diseases and pathogens. Root productivity. Legal aspects. Africa.

Production constraints, marketing, and consumption of root, tuber, and plantain crops in 23 countries of tropical humid Africa, where these are staple foodstuffs, are examined in order to (1) promote improved national strategies for these crops; (2) develop a basis for national and/or subregional development programs; (3) promote technical cooperation among countries; and (4) collect basic data for the Committee on World Food Security to be held in 1986. It was concluded that these products will continue to play an important role in the diets of most African countries, especially in the humid zones; they are considered a healthy option for a balanced diet since they are usually eaten with other high-protein, high-vitamin foods. Their cultivation is beneficial for agricultural reasons, and to generate marketable surpluses, to compete with imported cereals that drain out foreign exchange reserves, and to stimulate agroindustries. The main limitations and recommendations on general policies, marketing, and processing are listed. (CIAT)

0619

26784 WORKSHOP ON PRODUCTION AND MARKETING CONSTRAINTS ON ROOTS, TUBERS AND PLANTAINS IN AFRICA, KINSHASA, ZAIRE. 1985. Technical, economic and social constraints to the increased production of roots, tubers and plantains in Africa and related research programmes. In _____. Rome, Food and Agriculture Organization of the United Nations. v.1, pp.70-95. En.

Cassava. Production. Diseases and pathogens. Resistance. Plant breeding. Root productivity. Distribution. Cassava programs. Socioeconomic aspects. Developmental research. Africa.

The limitations to the production of cassava and other food crops in tropical Africa are analyzed. The highest producing crop, cassava, yields from 5 t/ha in Nigeria to 10-25 t/ha in Zaire, which is also the major cassava producer (14.6 million t in 1983), followed by Nigeria and Tanzania. The primary goal of cassava breeding should be the obtainment of

high yielding var. with resistance to pests such as Phenacoccus manihoti, Mononychellus tanajoa, M. progressivus, Meloidogyne incognita, M. javanica, and Zonocerus variegatus, and to diseases such as CAMD, CBB, anthracnose, and brown leaf spot. It would also be desirable to obtain var. with low HCN content, high quality and acceptability and, for easy harvesting, shallow and compact rooting habits. The main economic and social constraints are identified as labor scarcity (labor requirements vary from 100 to 300 men/day/ha/yr) and other social factors related to the particular limitations of the housewife-producer. Research and development projects by different institutions, regional and international research networks, and national programs are reviewed. Finally, research and development priorities are identified for these food crops. (CIAT)

0620

26792 YARADOUNO, B.R.; CONDE, L. 1985. Situation du secteur des tubercules, racines et plantains en Republique de Guinee. (The situation of root, tuber, and plantain crops in Guinea). In Workshop on Production and Marketing Constraints on Roots, Tubers and Plantains in Africa, Kinshasa, Zaire, 1985. Report. Rome, Food and Agriculture Organization of the United Nations. v.2, pp.104-111. Fr.

Cassava. Production. Marketing. Prices. Socioeconomic aspects. Statistical data. Developmental research. Cassava programs. Guinea.

The situation of roots, tubers, and plantain crops in Guinea is described. Large areas of land are planted to these crops but yields are poor (av. cassava yields, 7 t/ha). These products are subsistence foods and present a high level of self-consumption in rural areas. Processing factories for these products operate below their output capacity, mainly because of insufficient supply, and prices are fixed on a regional market level. Government policies are described and production constraints are analyzed: low yields, traditional cultural practices, diseases and pests, poor soils, inadequate cropping systems, unfavorable rainfall conditions, and lack of infrastructure, technical assistance, equipment, skilled labor, information on production systems, and logistic means for research and vulgarization. (CIAT) See also 0395 0408 0409 0416 0425 0426 0428 0429 0430 0432 0433 0437 0447 0454 0480 0491 0497 0505 0508 0523 0524 0536 0621 0628 0629 0630

K00 OTHER ASSOCIATED COMMODITIES

See 0406 0600

K01 Rotational Schemes and Intercropping

0621

28174 ANUEBUNWA, F.O. 1979. Economics of cowpea in late-season cassava/cowpea (interplant) production kit. Umudike, Nigeria, National Crops Research Institute. 11p. En., Sum. En., 10 Ref. Paper presented at 3rd NAFPP National Cassava Workshop, Umudike, Nigeria, 1979.

Cassava. Intercropping. Cowpea. Productivity. Production. Socioeconomic aspects. Cultivation. Timing. Planting. Nigeria.

In Anambra State, Nigeria, a trial was established at 3 different sites (Enugu, Awka, and Onitsha) to study the economics of intercropping cassava and cowpeas by testing 2 relative planting dates: simultaneous and cassava 1 mo. after cowpeas. While cassava yields were not measured, it was assumed that intercropping had no negative effects on yields. Cowpea yields

were higher on plots where cassava was planted 1 mo. later. The no. of man-days required per hectare in the plots with late-season intercropping was higher (145.9) than for cassava/cowpeas planted simultaneously (144.2) as was also the case for total costs. (CIAT)

0622

28530 ESCASINAS, A.B.; ESCALADA, R.G.; BALIAD, M.E. 1986. Root crops-legumes rotation at varying fertilizer levels. Annals of Tropical Research 8(2):87-95. En., Sum. En., 4 Ref. [Dept. of Agronomy & Soil Science, Philippine Root Crop Research & Training Center, Visayas, State College of Agriculture, Baybay, Leyte, Philippines]

Cassava. Fertilizers. Rotational crops. N. P. K. Yields. Costs. Income. Beans. Root productivity. Philippines.

A study was conducted to determine the amount of inorganic fertilizer needed by root crops to supplement the nutrients provided by the legume rotation crops, and to evaluate and select promising legumes for rotation with sweet potato, cassava, and gabi for optimum land productivity per unit time. A randomized complete block design with 3 replications was used. The rotation scheme started with root crops as the 1st crop. Cassava cv. Golden Yellow was planted at 100 x 75 cm. Most of the parameters studied (plant height, wt. of stem/plant, no. of marketable and nonmarketable roots/plant, and yield) did not vary with the legumes used in rotation (mung bean, bush bean, and soybean). Total cassava root yields ranged from 24.06 to 26.70 t/ha when rotated with legumes. Application of P and K without N (both at 30 and 60 kg/ha) did not increase cassava yield. When N was applied at 30 and 60 kg/ha, in addition to P and K, increased yields were obtained. Cost and return analysis indicated that cassava rotated with bush bean produced higher gross income and consequently higher net return. Results indicate that rotation planting of cassava with legumes seems profitable. (CIAT)

0623

26779 ESCASINAS, A.B.; ESCALADA, R.G. 1984. Crop rotation of sweet potato, cassava, and gabi with legumes as a cultural management system. Annals of Tropical Research 6:63-76. En., Sum. En., 8 Ref. [Dept. of Agronomy & Soil Science, Visayas State College of Agriculture, Baybay, Leyte, Philippines]

Cassava. Rotational crops. Legume crops. Economics. Root productivity. Groundnut. Philippines.

A study was conducted to (1) evaluate and select promising legumes that could be used in crop rotation with sweet potato, cassava, and gabi; (2) develop an effective cropping system using these legumes and the resp. crops for optimum productivity/unit time; and (3) determine whether the legumes could supplement the inorganic fertilizer needed to maintain soil fertility. Planting cassava in rotation with mung bean, bush bean, soybean, and groundnut did not affect cassava yield and yield components nor agronomic characters such as plant height, fresh wt. of stems/plant, and no. of marketable and nonmarketable tubers/plant. Results indicate that continuous legume-cassava rotations would reduce soil productivity despite the incorporation of legume residues and the addition of inorganic fertilizers during each planting. Cost and return analysis showed that among the legumes used as rotation crops, groundnut yielded the highest combined net return regardless of the root crop used, indicating that groundnut-root crop rotation is the most profitable cropping pattern. (CIAT)

0624

27622 GURITNO, B. 1984. The effect of maize population on the yield of maize and cassava in an intercropping system. Agrivita 7(1):1-6. En., Sum.

En., 7 Ref., Il. [Dept. of Agronomy, Faculty of Agriculture, Brawijaya Univ., Malang, Indonesia]

Cassava. Intercropping. Maize. Root productivity. Spacing. Indonesia.

The effect of maize population on the yield of maize and cassava in a mixed cropping system was studied in Landungsari (Malang, Indonesia) on a lowland rice field from July 1982 to May 1983. Monocropped cassava planted at 100 x 75 cm produced a higher root yield than when planted at 150 x 50 cm. In the 100 x 75 cm spacing, cassava yield decreased continuously with increasing maize density, while at 150 x 50 cm there was no reduction in cassava yield with increasing maize density up to 66,000 plants/ha. Intercropping cassava at 150 x 50 cm and maize at 50 x 45 cm yielded the highest LER (1.46). (AS (extract))

0625

28377 ODURUKWE, S.O.; IGBOKWE, M.C. 1981. Responses of cassava and maize to fertilization in mixed cropping. In NAFPP National Cassava Workshop, 5th., Umudike, Nigeria, 1981. Proceedings. Umudike, National Root Crops Research Institute. National Cassava Centre. pp.85-95. En., Sum. En., 6 Ref.

Cassava. Maize. Intercropping. Fertilizers. Productivity. Spacing. N. P. K. Nigeria.

The results of 4 expt. on the response of cassava and maize in mixed cropping to fertilization are presented. Expt. 1 studied the effect of 6 cassava population densities (5.0, 7.5, 10.0, 12.5, 15.0, and 17.5 x 10(3) plants/ha) and 5 fertilizer levels (0, 164, 328, 492, and 656 kg 30-15-90 (NPK)/ha, resp.). Intercropping decreased cassava yields significantly (av. 14.1 t/ha for intercrops vs. 18.3 t/ha for the monocrop). Total energy yield was significantly increased by fertilization. Expt. 2 determined the optimum fertilizer levels for cassava/maize. In 1978, only N levels affected yields significantly, while in 1979 P and K levels did so at the 0.1 level. In expt. 3 (effect of lime x K interactions on yields), 75 kg K/ha were enough to achieve almost max. yield in cassava var. TMS 30211 and 30568, but root yields increased consistently for other var. up to 150 kg K/ha. The increasing effect of K on root yield was better at pH 5.0 and 5.5 than at 6.0. In expt. 4 (loss of N in cassava/maize with and without N dressings) showed that highest N losses occurred in June while NO3-N was virtually depleted from the top soil in Aug. Applications of 100-150 kg N and 90-180 kg K/ha could be recommended for cassava/maize in eastern Nigeria. (CIAT)

0626

29033 OSSENI, B. 1985. Comportement des cultures vivrieres et légumieres sur les sols désaturés de basse Cote d'Ivoire a monoculture d'ananas. (Performance of food and vegetable crops integrated in pineapple monocultures in desaturated soils of lower Ivory Coast). Fruits 40(4):249-259. Fr., Sum. Fr., 12 Ref., Il. [Inst. de Recherches sur les Fruits et Agrumes, 01 B.P. 17?0, Abidjan 01, Republique de Cote d'Ivoire]

Cassava. Rotational crops. Soil requirements. Food security. Intercropping. Pineapple. Maize. Productivity. Cultivars. Ivory Coast.

The performance of a no. of food and vegetable crops integrated in pineapple monocultures in the desaturated soils of lower Ivory Coast has been followed for several years. The factor limiting the development of several of these cultures seems to be the low pH of the permeable and sandy soil. Yam and cassava both seem to adapt to the existing soil conditions, cassava yielding over 24 t/ha at all the trial sites and adapting well on

all soils. The crops cultivated on 2 district plots, pineapple on one and a rotation of (1) maize, groundnuts, cassava, and beans or (2) yam, maize, groundnuts, sweet potato, beans, and cassava, were interchanged after a period of 4 yr. It is concluded that the integration of food and vegetable crops in pineapple plantings presents numerous technical, financial, and social advantages for small planters. (AS)

0627

28115 PRESTON, S.R.; TAYLOR, S.R.; SIMONS, J.H. 1986. The choice of groundnut (Arachis hypogaea) varieties by smallholders in south-east Tanzania. 2. Variety x spacing and variety x sowing date interactions. Experimental Agriculture 22(3):279-287. En., Sum. En., Es., 14 Ref., Il. [14 Tarraway Road, Paignton, TQ3 2DU, England]

Cassava. Intercropping. Groundnut. Productivity. Technology transfer. Tanzania.

In a series of var. x spacing and var. x sowing date trials carried out in SE Tanzania, groundnut-cassava intercropping was evaluated over 2 seasons. Groundnut and cassava were sown in alternate rows (1982) and in single and double rows between the cassava rows (1983). Alternate cassava plants were harvested at the end of the dry season of 1982, leaving a staggered formation in alternate rows; the remaining plants were harvested after the groundnuts in 1983. Groundnut yields were consistently lower when intercropped with cassava due to the shade produced. There was no evidence that hypogaea forms are better adapted than Natal Common to mixed cropping with cassava. (CIAT)

0628

26378 SEGUY, L. 1984. A research and development operation: improved dryland rice based cropping systems for small farmers in the northeast of Brazil. International Rice Commission Newsletter 33(2):39-45. En.

Cassava. Developmental research. Technology. Rotational crops. Rice. Productivity. Income. Labor. Costs. Consumption. Brazil.

Work carried out by a research and development project for the introduction of new technologies into the traditional small farm upland rice cropping systems of the Cocais region in central Maranhao, Brazil, is reported. Agroeconomic data (yields, returns, no. of working days demanded, and value of a working day) are given for cropping systems that proved to be more interesting than the traditional system over a 3-yr period (1979-81). Rotations including cassava were preferred because of the favorable situation of this crop (strong market demand, high prices). Overall agricultural production, net income, and the value of the working day are higher for associated cropping and rotation with cassava than those obtained under the traditional system, largely due to the introduction of cassava. The benefits of the project are related to (1) the development of cropping systems that are motivating and simple to implement and that allow the preservation of local eating habits and traditional agricultural techniques; (2) the possibility of settling the farmer for at least 3 yr with some guarantee of stable yields; and (3) the possibility of defining the terms of annual rural credits for small producers. (CIAT)

0629

28508 UHAMMA, R.P.A.; ODURUKWE, S.O.; ENYINNIA, T. 1982. Preliminary investigations on integrated weed management in cassava (Manihot esculenta Crantz cv. TIS 30572) intercropped with maize (Zea mays cv. NS1). In NAFPP National Cassava Workshop, 6th., Umudike, Nigeria, 1982. Proceedings. Umudike, National Root Crops Research Institute, National Cassava Centre. pp.75-82. En., Sum. En., 9 Ref.

Cassava. Weeding. Intercropping. Maize. Herbicides. Energy productivity. Cowpea. Nigeria.

The results of preliminary research conducted in Umudike, Nigeria, on integrated weed management in intercropped cassava var. TIS 30572/maize are presented. Weed management involved hand hoeing, chemical control, biocontrol, and an integrated weed management method that consisted of a low herbicide rate + a low-growing live crop such as cowpea and groundnut. Uncontrolled weed growth reduced total energy yield by 62 percent. Intercropping per se reduced both cassava and maize yields. Three weedings conducted at 3 and 8 wk. after planting gave cassava yields (11.6 t/ha) comparable to weed-free monocropped cassava (12.3 t/ha) or cowpea interplanted in the cassava/maize mixture (10.6 t/ha). (CIAT) See also 0410 0412 0426 0434 0542 0545 0549 0555 0561 0582 0588 0590 0591 0593 0594 0596 0597 0601 0602 0613 0614

K02 Descriptive and Comparative Studies

0630

29043 OCITTI-OBWOYA, C.N.; OTIM-NAPE, G.W. 1986. Report on on-farm survey root crops-based farming system; Soroti, Kumi and Tororo Districts, Eastern Region, Uganda. Soroto, Uganda, National Root Crops Improvement Program. Serere Agricultural Research Station. 39p. En., Sum. En., Il.

Cassava. Root crops. Cultivation systems. Production. Cassava programs. Cultivation. Socioeconomic aspects. Technology transfer. Development costs. Income. Labor. Prices. Marketing. Uganda.

Results of a 1-mo. on-farm survey carried between May-June 1985 in the areas of Tororo and Soroti (Uganda) by a multidisciplinary team are reported. Objectives were to (1) understand the farmers' methods of production and production constraints so as to adjust future research programs and (2) design and develop appropriate production technologies that are technically within the farmer's abilities, culturally compatible, and economically feasible. Crop yields, particularly those of cassava and sweet potatoes, during the 1980/81 season were affected by the 1979 civil war. Production was low and yields were also depressed by drought. Labor and lack of farm inputs also affected crop output significantly. The present production level explains the significant role of cassava as the main cash source for 2 target groups; both farmers with and without cattle have the largest percentage of cultivable land under cassava. The difference in output between these groups indicate that the potential for increased production and yields of cassava and sweet potato exist provided constraints are overcome. For cassava, these are lack of proper agronomic and cultural practices, labor shortage, lack of incentives, limited no. of var., unavailability of planting material, pests and diseases, weeds, and soil fertility. (CIAT) See also 0395 0425 0429 0437 0463 0473 0560 0566 0626

ABBREVIATIONS AND ACRONYMS

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Af.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
AMV	Alfalfa mosaic virus
approx.	Approximate(ly)
Ar.	Arab
atm.	Atmosphere
ATP	Adenosine 5'-triphosphate
av.	Average
BAP	6-Benzylaminopurine
BBMV	Broad bean mosaic virus
BCMV	Bean common mosaic virus
Bg.	Bulgarian
BGMV	Bean golden mosaic virus
BGYMV	Bean golden yellow mosaic virus
BOD	Biochemical oxigen demand
BPMV	Bean pod mottle virus
BRMV	Bean rugose mosaic virus
BSMV	Bean southern mosaic virus
BV	Biological value
BYMV	Bean yellow mosaic virus
ca.	About (circa)
CAMD	Cassava African mosaic disease
CMV	Cassava African mosaic virus
CBB	Cassava bacterial blight
CBSD	Cassava brown streak disease
CEC	Cation exchange capacity
CER	CO2 exchange rate
CF	Cassava flour
CGR	Crop growth rate
Ch.	Chinese
CLM	Cassava leaf meal
CLV	Cassava latent virus
CM	Cassava meal
cm	Centimeter(s)
COD	Chemical oxigen demand
concn.	Concentration
CP	Crude protein
Cs.	Czech
CSL	Calcium stearyl lactylate
CSW	Cassava starch wastes
C.V.	Coefficient of variation
cv.	Cultivar(s)
2,4-D	2,4-dichlorophenoxyacetic acid
Da.	Danish
De.	German
DM	Dry matter
DNA	Deoxyribonucleic acid
EC	Emulsifiable concentrate
EDTA	Ethylenediaminetetraacetic acid
EEC	European Economic Community
e.g.	For example
ELISA	Enzyme-linked immunosorbent assays
EMS	Ethyl methane sulfonate
En.	English
EP	Preliminary Trials, CIAT
Es.	Spanish
expt.	Experiment(s)
exptl.	Experimental
Fr.	French
ft-ca	Foot candles (10.76 lux)
FYM	Farmyard manure
g	Gram(s)
G	Giga (10⁹)
GA	Gibberellic acid
gal	Gallon(s)
GE	Gross energy
GERs	Glucose entry rates
GLC	Gas-liquid chromatography
Gr.	Greek
h	Hour(s)
ha	Hectare(s)
HCN	Hydrocyanic acid
HDP	Hydroxypropyl distarch phosphate (modified cassava starch)
He.	Hebrew
Hi.	Hindi
HI	Harvest index
hp	Horsepower
Hu.	Hungarian
IAA	Indoleacetic acid
IBA	Indolebutyric acid
IBYAN	International Bean Yield and Adaptation Nursery, CIAT
Il.	Illustrations
in.	Inches
In.	Indonesian
It.	Italian
IU	International unit
J	Joule
Ja.	Japanese
kat	Katal(amount of enzymatic activity that converts 1 mole of substrate/s)
kcal	Kilocalorie(s)
kg	Kilogram(s)
kJ	Kilojoule

km	Kilometer(s)
KNap	Potassium naphthenate
Ko.	Korean
kR	Kiloroentgen(s)
La.	Latin
LAD	Leaf area duration
LAI	Leaf area index
lat.	Latitude
lb	Pound(s)
LD50	Mean lethal dose
LER	Land efficiency ratio
LPC	Leaf protein concentrate
lx	Lux
M	Mega
m	Meter(s)
Mal.	Malay
max.	Maximum
MC	Moisture content
ME	Metabolizable energy
meq	Milliequivalent(s)
met.	Methionine
mg	Milligram(s)
mho	Reciprocal ohm
min.	Minimum
min	Minute(s)
ml	Milliliter(s)
mm	Millimeter(s)
mo.	Month
mol. wt.	Molecular weight
m.p.	Melting point
NAA	Alpha-naphthalene acetic acid
NAD	Nicotinamide adenine dinucleotide
NADH	Nicotinamide adenine dinucleotide, reduced form
NAR	Net assimilation rate
NCE	Net CO2 exchange
NE	Northeast
NER	Net energy ratio
Nl.	Dutch
nm	Nanometer(s) (10-9 m)
no.	Number(s)
No.	Norwegian
NPFs	Negative production factors
NPR	Net protein ratio
NPU	Net protein utilization
NW	Northwest
OM	Organic matter
oz	Ounce(s)
p.	Page
P	Probability
Pa	Pascal(s)
PAN	Peroxyacetic nitrate
PCNB	Pentachloronitrobenzene
PDA	Potato dextrose agar
PER	Protein efficiency ratio
pH	Hydrogen ion concentration
Pl.	Polish
pp.	Pages
pphm	Parts per hundred million
PPI	Preplanting incorporation
ppm	Parts per million
PSA	Potato sucrose agar
Pt.	Portuguese
pv.	Pathovar
Ref.	Reference
resp.	Respective(ly)
Rf	Retardation factor-chromatography
RGR	Relative growth rate
RH	Relative humidity
RNA	Ribonucleic acid
Ro.	Romanian
rpm	Revolutions per minute
Ru.	Russian
s	Second
SBM	Soybean meal
SCN	Thiocyanate
SCP	Single cell protein
SDS	Sodium dodecyl sulfate
Sk.	Slovak
Sn.	Slovene
sp.	Species
spp.	Species
SSL	Sodium stearyl-2-lactylate
Sum.	Summary
Sv.	Sweddish
t	Ton(s)
TDN	Total digestible nutrients
temp.	Temperature
TIA	Trypsin inhibitor activity
TIBA	2,3,5-Triiodobenzoic acid compound with N-methylmethanamine
TLC	Thin-layer chromatography
TMV	Tobacco mosaic virus
Tr.	Turkish
TSH	Thyroid-stimulating hormone
UDPG	Uridine diphosphate glucose
Uk.	Ukrainian
UMS	Unmodified cassava starch
Ur.	Urdu
UV	Ultraviolet
var.	Variety(ies), varietal
VEF	Bean Team Nursery, CIAT
VFA	Volatile fatty acids
vol.	Volume
VPD	Vapor pressure deficit
vpm	Volume per million
vs.	Versus
W	West, watt
wk.	Week
WP	Wettable powder
wt.	Weight
yr	Year(s)
/	Per

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