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TERMINAL REPORT

Moisture Conservation and Utilization in Low Winter Rainfall Areas of LDCs

TERMINAL REPORT

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MOISTURE CONSERVATION AND UTILIZATION IN LOW WINTER RAINFALL AREAS OF LDCs

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211(d)

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AID/ta-G-1221

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Agency for International Development
and
Oregon State University

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December 1980

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PROGRAM PROFILE

Grant title:

MOISTURE CONSERVATION AND UTILIZATION
IN LOW WINTER RAINFALL AREAS OF LDCs

Grant number:

AID/ta-G-1221

Grantee:

Oregon State University

Grant program director:

S.F. Miller

Period of grant:

July 1, 1975 through June 30, 1980
plus 6-month extension, without additional funding
July 1, 1980 through December 31, 1980

Amount of grant:

$1,000,000

INTRODUCTION

BACKGROUND

Contrary to the popular belief that Oregon receives continuous heavy precipitation, the state's immense central and eastern regions receive relatively small amounts of rainfall concentrated during a few months of the winter season. Agriculture in the area, aside from that under irrigation, depends solely on winter season rainfall for crop-supporting moisture and is, in the full sense of the term, dryland agriculture devoted to small grains and animal forage.

Oregon State University and the state's agricultural experiment station have devoted extensive effort over many years to the development of technology and practices for improving agricultural production in the dryland areas. One of the primary thrusts has involved conservation and beneficial utilization of available moisture. Numerous disciplines have participated in the ongoing effort resulting in the establishment of a significant body of information and experience with dryland agricultural production dependent on winter rainfall.

OSU staff members had previous experience with international programs (in Turkey and Jordan) oriented toward increasing cereal production and expanding cereal production research and extension. The existence of these programs, plus the interest and experience of OSU in dryland agricultural development, led to discussions with the U.S. Agency for International Development and ultimately resulted in AID awarding a 5-year grant to OSU to marshall and expand its expertise and to develop a center of excellence in dryland agriculture that could be harnessed for application to less developed countries. The grant, entitled Moisture Conservation and Utilization in Low Winter Rainfall Areas of LDCs, was subsequently launched in mid-1975, conducted for 5 1/2 years (including a 6 month extension with no additional funds) and terminated in December 1980.

The specific purpose of the grant was to mobilize and expand institutional response capability at Oregon State University to focus on moisture conservation and utilization in relation to food production with emphasis on small farms in low winter rainfall (Mediterranean climate) areas of the LDCs.

The grant was designed to allow OSU to develop broader response capability in: 1) situations involving grain-livestock interaction as a major dryland activity; 2) improved moisture conservation and utilization related to the grain-animal-forage production complex; and, 3) more efficient use of farm power and equipment within LDC social and economic constraints.

GRANT OBJECTIVES

In the broad perspective, the grant's objectives encompassed the establishment and development of a center of competence with the ability and willingness to respond to the needs of LDCs in low winter rainfall areas throughout the world to improve dryland farming systems and, by extension, the quality of life.

Five major objectives/outputs were defined for the grant.

Output #1 - Establish and operate a centralized information system.

Output #2 - Develop and provide an education training program specifically addressed to problems of LDCs.

Output #3 - Expand, improve, and marshal an institutional research capability and knowledge base.

Output #4 - Develop and provide increased advisory capacity.

Output #5 - Promote and strengthen domestic and international linkages.

Objectives/outputs are further detailed in the grant work plan (as revised), included as Appendix II.

ACCOMPLISHMENTS

Accomplishments under the grant are discussed within the framework of the five objectives/outputs. The o/o are condensed to just the underlined words in the foregoing secton. Further, activities are separated according to the period of the first four years of the grant (previously reported), and the last year and a half.

At the outset of the grant, an organizational structure was created within Oregon State University to administer and conduct grant activities. The main group in this effort became the Dryland Agriculture Technical Committee (Techcom). Appendix I lists Techcom members and other OSU staff persons and graduate students involved with the grant.

1. Centralized Information System

The task was approached by: a) identifying the parameters of subject matter pertinent to winter rainfall dryland agriculture; b) ferreting out those publications that met these parameters; c) devising and implementing a method for developing an accessible list of relevant publications; and, d) setting up a system for delivering information to workers in LDCs.

Techcom members collaborated with project librarians attached to the staff of the William Jasper Kerr library at OSU to establish and identify the scope of material to be cataloged in a special dryland collection. Subjects related to moisture conservation, farming systems, dryland crops, forage production, and animal production systems all readily fell within the targeted topics. So too did scientific papers relating to principles and technology concerning small dryland farm agriculture.

A decision was made to incorporate journals, books, serials, papers, bulletins, and previously uncataloged reports from the United States and the North African-Mediterranean region.

Literature was collected and housed in Kerr Library in either the main library collection or in a special collection

room assigned to the dryland agriculture program. The materials were indexed, coded, filed, and entered into a specially developed computerized system. The original documents were, and are, available to research personnel both inside and outside the university through library check-out and loan channels.

Over 4,000 entries were cataloged during the first 4-year period. In the same time frame the grant published the first Bibliography of Dryland Agriculture, a second edition to the Bibliography, and a first supplement to the second edition. Each publication was separated into a main title list, an author index, and a subject matter index. Over the course of the period the computer system employed to provide information retrieval and generate bibliographic printouts was upgraded to produce more usefully arranged information. Individual citations contained author, title, and source, and were accessed by a series of descriptive key words. A sample search is included as Appendix IV.

The full print run of all the bibliographic editions was distributed to recipients either in dryland LDCs directly, through a third party (AID, World Bank, Foundations, IARCs), or to other interested researchers. Further, a system was developed for information delivery concerning specific items mentioned in the bibliographies. A method of photocopying (as permitted by copyrights) up to 200 pages without cost, and beyond at minimal cost, for requests from LDCs was implemented. Initial response was low, partly due to limited publicity given the service. By the fourth year the grant received requests for nearly 3,000 pages of photocopied material representing 137 items.

During the final year of the grant the Bibliography of Dryland Agriculture, Third Edition, was prepared and published as a two-volume set. An advance letter offering the publication was sent to former contacts permitting interested individuals to complete and return a tear-off notice indicating their desire to receive a copy of the Bibliography.

The Third Edition contained over 700 new citations (for the system) plus all former citations, for a total of over 4,700 entries. A revised and improved computer format was developed and utilized.

Document delivery tapered off during the fifth year of the program, but still amounted to nearly 2,000 pages of photocopied material and 40 items.

The three individuals that served as project librarians provided highly useful input in supporting the work of the Techcom and in compiling a massive collection of relevant information.

The bibliographic search system will be maintained as an integral part of the William Jasper Kerr Library, OSU. Additionally, to make the system more accessible, the computer tapes were forwarded to the CIDNET (Consortium for International Development network) at the University of California, Riverside, where the material is available upon request.

MINI SUMMARY

The grant established a centralized information facility, reviewed available literature, compiled several bibliographies of relevant dryland information, instituted and operated a document delivery system, interacted with other institutions concerned with dryland agriculture, and in the process made dryland literature more available to researchers in both the developed and developing countries.

2. Education
   Training
   Program

The Techcom thoroughly reviewed existing class offerings at OSU with the intent of determining which were relevant to students concentrating on dryland agriculture (or related majors) and what courses could be assembled to form a Master of Agriculture in Dryland Agriculture.

The Ag.M. offers a highly flexible, practically oriented program and does not require a thesis. Forty-five total class hours are needed with a minimum of 9 hours in each of at least three fields and with not more than 21 hours in any one field. A paper--demanding 3-5 hours of Reading and Conference in the department of major interest--replaces the thesis.

During the summer between the first and second years Ag.M. candidates participate in a supervised project (involving actual field work) consistent with both the major area of interest and ultimate career activity.

A series of Ag.M. sample programs with major emphasis in Agricultural and Resource Economics, Soils, Crop Science, Rangeland Resources, and Agricultural Engineering Technology were prepared by the Techcom. Several individuals from LDCs began Ag.M. programs. A total of 14 individuals in advance degree programs received support from the grant (see Appendix VII).

An intensive 2-week short course to increase understanding of dryland agriculture's potential and production problems was organized and presented at the end of the third year of the grant. Registered attendees at the course, 10 in all, represented Algeria, Turkey, Peru and the U.S. including a Peace Corps trainee. Several CIAT trainees also participated.

The course emphasized cereal and livestock production. To supplement classroom material, several field trips were undertaken to dryland areas in Oregon. A practical exercise in sprayer calibration required attendees to actually conduct the necessary procedures and calculations.

The two institutions holding 211(d) grants for rainfed agriculture--University of California, Riverside, and Oregon State University--jointly organized and presented a 1-week conference entitled International Symposium on Rainfed Agriculture in Semi-arid Regions, during 1977. The event, held at Riverside, attracted more than 100 attendees and participants representing 17 nations. In addition to 18 major papers, a series of shorter presentations were offered as well as panel discussions. A 2-day field trip through major agricultural regions of Southern California followed.

Several members of the Techcom, plus other scientists from OSU, presented papers at Riverside. Moreover, four key speakers were contacted and brought to the symposium to share their expertise under support of the OSU grant program. The proceedings of the symposium were edited and published as a 703-page landmark effort. The UCR and OSU programs jointly underwrote publication costs, and collaborated in distributing copies worldwide.

Techcom members, throughout the grant period, functioned as graduate student advisers. Graduate projects ranged from assessment of nutrient levels in cereal aftermath to determination of soil moisture-temperature relationships.

The Techcom, through the Office of International Agriculture at OSU, produced and distributed a multi-page leaflet entitled

Does Oregon State University Offer Training in Dryland Agriculture? Material presented answered the question affirmatively and set out the facilities and capabilities of OSU to address education and training programs related to dryland agriculture.

In addition to OSU's 186-acre university farm in the Willamette Valley, the region branch research experiment station at Moro, Oregon, exists as a site for research and training. The station, located in a major dryland agricultural region of the Pacific Northwest, was upgraded through the grant to provide significantly increased capability for supporting dryland research and training activities.

MINI SUMMARY

During the grant period OSU moved in several areas to expand and improve dryland training and education through course review, participation in training events and symposia, upgrading facilities, graduate student advising, and preparation of specifically tailored programs for LDC representatives.

3. Institutional Research Capability and Knowledge Base

One of the major outputs was the Techcom's collective authorship and sponsorship of the publication Dryland Agriculture in Winter Precipitation Regions of the World, Status of the Technical Art. The multiple objective was to describe the present state of the art in dryland agriculture (particularly emphasizing North African and Mediterranean nations), assess the level of scientific knowledge available regarding utilization and management of drylands in winter rainfall areas, and lastly identify gaps between the information known and the methodology being employed and, if possible, analyze the reasons why those gaps exist.

A complete review of scientific literature was conducted as a prelude to preparing the publication. Further, several trips to dryland regions were taken by Techcom members to gain familiarity with "real" LDC conditions. Countries visited ranged from Morocco to Pakistan. Additionally, several OSU scientists visited Australia to learn more about the Australian system of dryland farming and thereby gain a basis for judging its relevance to LDC dryland farming.

Of the total 500-copy print run, only 34 copies remained on hand with the Techcom following worldwide distribution.

The review of literature conducted for the state of the arts publication led to identification of several gaps in available information, areas that stood in need of research data to more accurately define the various trade-offs existing in LDC dryland farming. The Techcom formalized these data voids in the shape of research proposals, as follows:

- Winter annual legume-livestock-cereal crop management systems:
- Study of the economics of livestock and forage production on cereal-livestock farms in North Africa:
- Minimum equipment requirements and effectiveness of small-sized implements for dryland cereal production.

These research proposals were brought to the attention of AID representatives conducting an 18-month grant review. The proposals were withdrawn, however, after a decision was made that OSU develop a unified program for AID/Washington consideration.

In lieu of formally based research projects, several mini-grant research efforts were established. Research arising from the mini-grants generated numerous papers and presentations (see appendixes III and VII).

Nutritive value of cereal crop aftermath

R.F. Miller and A.H. Winward initiated a study of wheat and barley aftermath (material remaining in the field following harvest) to assess its value as a grazing source for domestic animals. This arose from the practice of pasturing cattle, goats, or sheep on harvested grain fields, a common occurrence in LDCs. An evaluation was needed to compare this practice with the possibility of more timely fallowing or the possible commencement of operations for the following crop.

The effort also attempted to determine the effects of crop variety, varying environmental conditions, season of use, and the selectivity toward certain plant parts on the overall nutritive quality of aftermath.

Results indicated that two types of wheat and one variety of barley tested yielded higher amounts of crude protein on

those sites that had greater moisture stress and lower fertilization levels. Plant leaves were more nutritious than culms. Greater total aftermath yield occurred on wetter, more fertile locations.

A follow-on research program has begun with a goal of establishing the influence of precipitation and fertilization on cereal aftermath. Results could help define levels of inputs as well as cultural regimes.

Moisture, fallow and dryland cereals

At the Moro station, F.E. Bolton directed research on several aspects of dryland cereal production. One thrust attempted to isolate the relationship of soil moisture, under mulch and fallow treatments, to winter crop emergence. Rationale was based on the possibility of developing information that could help to improve grain production.

Initial results indicate the possibility of using past precipitation and yield records in a model to predict nitrogen needs of a particular crop, as well as to more accurately assess moisture availabilities. Savings associated with reduced nitrogen fertilizer or increased revenue from higher crop yields may result.

A second effort concerned experimentation with strip tillage as a summer fallow for dryland cereal production. The procedure, an alternative to zero tillage, produced cereal yields equivalent to conventional full tillage, but reduced the costs, energy consumption, and erosion potential.

Tom Nordblom, Mike Glen and Stan Miller, utilizing the data of Miller and Bolton developed a simulation model for testing fertilizer strategies for dryland wheat where the crop residue can be used as winter feed for beef cattle.

A fifty year long sequence of weather data, from Moro, Oregon, is used to simulate a series of yield potential and nitrogen mineralization forecasts and final estimates for each year. Along with seeding dates, these weather-determined variables are calculated in the "common crop forecast and timing model". This provides the common basis for running the "strategy model" with various combinations of blind and calculated fertilizer applications.

The strategy model provides a means of simulating the economic outcomes of various fertilization plans under different cost and price assumptions. For each strategy run a series of per hectare net incomes are computed for two cases. First is the case where the feed value of the chaff is considered in addition to grain sales income. These series are each summarized by mean and variance statistics for comparison between strategies.

Management of winter annual legumes and winter wheat

This mini-grant research effort under the leadership of T.L. Jackson had the objectives of: 1) defining optimum levels of P, K, and S that should be maintained in sub-clover plants; 2) describing effects of maturity on changes in nutrient concentrations in plants; and, 3) evaluating effects of P, S, K, Mo, and lime on the amount of N fixed by sub-clover pastures.

Thesis publications, publications in the Agronomy Journal, and papers presented at the Western Soil Science meetings indicated the scope of research undertaken and the progress in achieving the stated objectives.

The mini-grant effort, through the 211(d) grant, had another beneficial side effect through a shift in research emphasis for T.L. Jackson, Department of Soil Science, from potatoes and vegetable crops to winter wheat and subterranean clover. Results from mini-grant related wheat research in western Oregon suggested that banding ammonium sources of N and including chloride (Cl) in the fertilizer band reduced the severity of take-all root rot, a serious yield-reducing disease of wheat.

These initial findings led to an expanded joint research program between the departments of Soil Science and Botany-Plant Pathology with significant financing from other sources.

Work in Plant Pathology has established that the Cl ion increases the dominance of pseudomonads organisms associated with take-all decline--a biological system that attacks the take-all root rot fungus.

Additional research has revealed that spring applied Cl fertilizers increase osmotic concentration of cell sap and leaf water potential. Plants with higher osmotic concentrations in cell sap have greater resistance to disease. Field

experiments in 1980 showed reduced infection with strip rust where spring applications of Cl were made. A lower (more negative) leaf water potential increases the driving force to move water from the soil to the plant.

Theses effects of Cl on susceptibility of wheat plants to diseases and changes in leaf water potential are regarded as a major finding in soil fertility-plant nutrition-plant disease relationships.

MINI SUMMARY

In preparing material for an exhaustive state-of-the-technical arts publication the Committee identified areas in need of research, moved to bring these to AID's attention, and then, as an alternative, turned to mini-grants. Results from mini-grants in three broad segments of dryland agriculture produced some intriguing and useful data including what is being regarded as a major finding.

4. Increased Advisory Capacity

Advisory activities of the Techcom began slowly, then increased in reflection of gaining further insight and information to the relevant dryland problems of LDCs. A chronological review follows.

1975-76

On the Techcom's initial trip to North Africa, it was asked to evaluate a proposal developed by AID/Rabat for dryland agriculture. The evaluation was performed.

A series of visitors with experience or background in LDC drylands held informal seminars with the Techcom. These included plant breeders, agronomists, soil scientists, and economists.

1976-77

The Techcom responded to a request from AID to prepare proposals for a dryland program in Morocco and a seed production project, also in Morocco. Both were duly prepared and

submitted. Neither proposal was accepted.

At the request of AID/Washington (Bureau for Near East), F.E. Bolton traveled to Washington and presented a one-day seminar on problems associated with adopting improved dryland agricultural technology in LDCs. Over 20 staff members of AID attended.

T.L. Jackson was asked by AID to accept membership on a team being organized to carry out an extensive review of the barrani project in Pakistan. The request was accepted and Dr Jackson began background familiarization. The trip later aborted.

A 10-week conversational French program was presented to Techcom members with the aim of increasing effectiveness in operating in the Francophone dryland LDCs.

At the request of the Consortium for International Development (CID), the dryland grant staff conducted a personnel resource survey of all CID member institutions to assemble a roster of personnel with applicable expertise Faculty members were polled via a questionnaire and the results summarized and submitted to CID. Education, areas of specialty, language competence, and international experience all were requested as well as availability for overseas assignment.

1977-78

F.E. Bolton attended two conferences concerning dryland agriculture and presented papers at both.

Based on information disseminated through the Title XII effort, the Techcom initiated discussions with the intent of drawing up a proposal to submit to BIFAD. The document was prepared and submitted in June 1978. The proposal outlined areas of unexplored problems revolving around the cereal-forage-animal complex in dryland areas. Complimentarities of research and the importance of a multi-disciplinary approach were cited as key factors to gaining effectiveness in coping with the task.

1978-79

Building on the previously submitted proposal (to BIFAD), the Techcom assessed the current capabilities and interests of

OSU, matched these with existing institutional gaps, and then prepared a strengthening grant proposal for internal review and eventual submission within the Title XII framework. The proposal, with university administrative backing, clearly emphasized OSU's intent and desire to further develop, strengthen, and apply expertise in dryland agricultural research.

F.E. Bolton accepted an invitation to participate in the Fifth Regional Cereals Workshop in Algiers, where he presented one of the lead papers. He also chaired one of the main sessions as well as the study group that summarized the session concerning agronomic constraints to dryland production.

T.L. Jackson, at the request of AID, undertook a consultancy to the Dominican Republic to evaluate the possibility of potato seed production, to review the soils curriculum at the University of Santiago, and to review soil erosion and crop production problems on hill soils.

A.H. Winward traveled to the headquarters of the Consortium for International Development to meet with representatives from other member institutions concerning the Kenyan Kiboko Range Project. He assisted in drafting a request-for-proposal and in identifying a lead unversity. Similar responses were made to requests for possible participation in projects cited in Sudan, Yemen, Egypt, Sri Lanka, and Tanzania.

1979-80

F.E. Bolton traveled to Australia to represent the Techcom at the International Congress on Dryland Farming. He presented several papers for Techcom members, took part in field tours, expedited distribution of grant-related publications, and interacted with scientists from around the world concerned with the central topic.

Early in 1980 R.F. Miller traveled to Chile, presented a paper at the 3rd International Congress on Arid and Semi-Arid Zones, and visited two educational institutions concerned with dryland range research.

MINI SUMMARY

The Techcom, as a group and as individuals, responded to a variety of requests for advising and proposal preparation, engaged in travel, and participated in relevant symposia and conferences.

5. Domestic and International Linkages

Visitors to OSU, travel by Techcom members, and interaction with a variety of organizations characterized the grant's world linkages. A series of individuals, predominantly short term visitors representing educational institutions, research centers, governmental groups, and private industry, visited OSU and met with various Techcom members (Appendix V).

A close linkage was forged with ICARDA, the International Center for Agricultural Research in Dry Areas at Aleppo, Syria. Several Techcom members visited ICARDA. F.E. Bolton visited CIMMYT, and five CIMMYT trainees took part in the grant-organized short course in 1978.

F.E. Bolton served as a member of a four-person consulting team for Kansas State University that conducted a survey of agricultural potential in the Central Tunisian drylands.

T.L. Jackson, as a memb[illegible] the editorial committee for the Agronomy Society of America d[illegible] monograph, attended a 2-day meeting in Denver to review pr[illegible] and develop chapter outlines. He further participated in additional meetings and draft reviews. The publication will be a major contribution to the literature of dryland agriculture.

In 1979, F.E. Bolton consulted with ICARDA staff members and reviewed the Center's field research program. He also met with members of the Farming Systems section to discuss activities. Dr. Bolton also was invited to the CIMMYT regional research center at Obregon, Mexico, to review the agronomy training program.

Grant personnel, with R.F. Miller coordinating, responded to a request from staff at ICARDA for quantities of seed for each of several varieties of plants used in range research. The seed packets were obtained and forwarded to ICARDA.

OSU, through its affiliation with CID, maintained close liaison with the Consortium, member institutions, and related programs. The affiliation began in 1975 when OSU agreed to accept active membership in the Consortium along with a group of western U.S. universities involved with agriculture. Each year since, OSU has included a budgeted line item for CID membership-support. OSU faculty, as members of the governing board, have

helped guide the Consortium; they have also participated in the CIDENT information system, conducted the aforementioned personnel resources survey, and assisted with the evaluation of numerous programs, and preparation of detailed proposals.

Membership in and activity within the Consortium, plus grant programs, helped prepare and facilitate OSU's acceptance of major roles connected to AID projects in Tunisia and North Yemen. For the latter, OSU will serve the Consortium as lead university in a massive program to increase income and improve the quality of life for rural inhabitants through improved agriculture and social conditions.

MINI SUMMARY

Through visitation, travel, and exchange of information, OSU faculty, supported in part by the grant, significantly increased effective working relationships with domestic and international institutions similarly concerned with improvement of agriculture in the world's low winter rainfall drylands.

FINANCIAL REVIEW

1

EXPENDITURES (July 1, 1979 through December 31, 1980)*

I. Salaries				
A. Academic			$174,247	
B. Other				
Library		$6,750		
Clerical		12,380		
Other non-professional		8,612		
			27,742	
TOTAL SALARIES AND WAGES				$201,989
II. Other Payroll Expenditures				48,788
III. Student support				-
IV. Consultants				-
V. Guest lecturers, visitors, etc.				-
VI. Travel			total amount	
A. Domestic			3,695	
B. Foreign			22,770	
TOTAL TRAVEL				26,465
VII. Equipment				17,032
VIII. Library acquisitions				138
IX. Publications				8,078
X. Other				42,621
			TOTAL FOR PERIOD	$345,111

*Estimated

2

BUDGET AND EXPENDITURES

Category	Total Budget A	Total Expended as of 6-30-79 B	Total Expended 7-1-79 through 12-31-80* C	Balance A - (B + C)
Academic Staff	$470,817	$385,651	$169,659	-$84,493
Classified Staff and Students	78,183	33,965	32,330	11,888
Total Salaries and Wages	549,000	419,616	201,989	-72,605
Other Payroll Expenditures	82,822	65,113	48,788	-31,079
Materials and Services	83,678	24,026	35,786	23,866
Computer Costs	17,000	6,300	5,973	4,727
Publication Costs	20,000	2,362	8,078	9,560
Travel	127,500	73,154	26,465	27,881
Contribution to CID	50,000	22,000	1,000	27,000
Equipment	70,000	42,318	17,032	10,650
TOTALS	1,000,000	654,889	345,111	0

*Estimated

3

DISTRIBUTION OF 211(d) GRANT FUNDS AND CONTRIBUTIONS FROM OTHER SOURCES OF FUNDING BY GRANT OBJECTIVE

Grant Objectives by Output	Cumulative Total Through June 30, 1979	July 1, 1979 Through Dec. 31, 1980*	Total
Centralized Information System	$ 98,459	$ 51,766	$150,225
Education and Training	131,617	69,022	200,639
Research Capability and Knowledge Base	324,506	172,555	497,061
Advisory Capability	56,658	34,512	91,170
Domestic and International Linkage	43,649	17,256	60,905

*Estimated

APPENDIXES

I. OSU Dryland Agriculture Technical Committee, Associated Graduates, and Staff.

II. Work Plan.

III. Publications, Papers, Presentations, and Theses.

IV. Sample Search of Computerized Dryland Data File.

V. A Selected List of Short-Term Visitors.

VI. Equipment to Implement Grant Activities.

VII. Individuals in Advanced Degree Programs Receiving Support from the 211(d) Grant

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Appendix I. OSU Dryland Agriculture Technical Committee, Associated Graduates, and Staff.

*

Individuals associated with the grant program at Oregon State University for the period indicated. FTE = full-time equivalent.

*

Techcom

F.E. BOLTON - Crop Science, 1.00 FTE, July 1, 1975-Dec. 31, 1980.

D.E. BOOSTER - Agricultural Engineering, .25 FTE, July 1, 1975-Dec. 31, 1980.

J.B. FITCH - Agricultural Resource Economics, 1.00 FTE, July 1, 1975-Aug. 31, 1977.

T.L. JACKSON - Soil Science, .50 FTE, July 1, 1975-Dec. 31, 1980.

R.F. MILLER - Rangeland Resources, .25 FTE, Jan. 1, 1977-Dec. 31, 1980.

S.F. MILLER - Agricultural Resource Economics and grant director, .50 FTE, July 1, 1975-Dec. 31, 1980.

C.H. ULLERY - Soil Science, .50 FTE, July 1, 1975-June 30, 1976.

A.H. Winward - Rangeland Resources, .50 FTE, July 1, 1975-Nov. 1, 1980.

Associated Graduates

A. CAREY - Animal Science, .50 FTE.

J.P. ESTES - Crop Science, .50 FTE.

D.M. GLENN - Crop Science, .50 FTE.

R.L. HENDERSON - Crop Science, .50 FTE.

C.S. MEE - Rangeland Resources, .50 FTE.

Staff

P.A. BROWN - Clerical, International Agriculture, .50-1.00 FTE, Aug. 16, 1976-Dec. 31, 1980.

A.E. DEUTSCH - Information, International Agriculture, .10-.50 FTE, July 1, 1975-Dec. 31, 1980.

S.M. KHAN - Dryland Librarian, .50 FTE, Nov. 15-1978-June 30, 1980.

M.S. KRISSEK - Clerical, International Agriculture, .10-.50 FTE, Mar. 12, 1979-Dec. 31, 1980.

S.M. NEULIST - Clerical, International Agriculture, .50 FTE, Jan. 15, 1980-Nov. 22, 1980.

S.K. RIEHL - Dryland Librarian, .50 FTE, July 1, 1975-June 30, 1977.

G.D. SMITH - Field Technician, .50 FTE, Feb. 1, 1976-June 30, 1980.

A.E. WOLFF - Dryland Librarian, .50 FTE, July 15, 1977-June 30, 1978.

Oregon State University

MOISTURE CONSERVATION AND UTILIZATION
IN LOW WINTER RAINFALL AREAS OF LDCs

211(d) Program

AID/ta-G-1221

WORK PLAN (Revised 3/77)

OUTPUT: #1 Centralized Information System

ACTIVITY	STAFF	START/FINISH DATES	SCHEDULED EVENTS/TARGETS	EXPECTED RESULTS
A) Collect, evaluate, inventory and disseminate information covering current LDC, U.S. and other developed countries' dryland agricultural production systems.	All	Sept. 1975-Sept. 1977	CID Information Workshop Sept. 22-26, 1975.	Published information summary and computer listing of available reference materials at OSU and other CID institutions.
1) Assessment of availability of current information already assembled at UCR, other CID Universities, and other institutions and/or agencies (USDA, FAO, etc.).	All		Visit UC/R Oct. 1975.	
2) OSU library linked to UCR and CID library information systems.	Lib.			
3) Assist in developing integrated information system in cooperation with CID Universities.	Lib., Dir.			
4) Develop an information dissemination system consistent with available resources.	Lib.	Jan. 1977	Active functioning program.	Dryland information more readily available to LDC scientists.
B) Integrate information from the State-of-the-Art survey of LDC's in low rainfall areas into the information system.	Lib.	Cont. through Jan. 1978		
C) Inventory sources of individual and institutional talent within LDC's and developed countries.	All	Cont. through July 1978	Questionnaire sent to all OSU Faculty - Jan. 1976; incorporation of talent into general CID pool.	Improved response capability.
D) Disseminate new knowledge from the State-of-the-Art survey through textbooks, newsletter, technical bulletins and extension-type publications.	All	Cont. through July 1978	Determination of appropriate method of dissemination July 1978.	Improved scientific awareness of the State-of-the-Art.
E) Design and develop an information retrieval system for acquisitions and dissemination of materials from the information bank, in cooperation with CID.	Lib., Dir.	Sept. 1975 - Jan. 1976	CID Information Workshop Sept. 22-26, 1975; initiate information retrieval systems Nov. 1975.	A computerized, searchable retrieval system available to scientists conducting research in dryland areas.

Oregon State University

MOISTURE CONSERVATION AND UTILIZATION
IN LOW WINTER RAINFALL AREAS OF LDCs

211(d) Program

AID/ta-G-1221

WORK PLAN (Revised 3/77)

OUTPUT: #2 Education and training program specifically addressed to problems of LDC's

ACTIVITY	STAFF	START/FINISH DATES	SCHEDULED EVENTS/TARGETS	EXPECTED RESULTS
A) Identify LDCs' educational needs in dryland agriculture as part of the State-of-the-Art survey.	All	March 1976 - Oct. 1976	On-site visits to Med. region March-May 1976; Sept.-Oct. 1976.	Identified education needs and priorities for both formal and informal training.
B) Establish an interdisciplinary curriculum committee to evaluate existing course offerings and to identify areas of need.	All	Jan. 1976 - March 1976	First draft of suggested curriculum changes, Feb. 1976.	Improved curriculum for formal training in dryland production and utilization.
C) Develop capacity to handle an increased number of LDC and U.S. graduate students in disciplines associated with dryland agriculture.	All		First student arrivals, Sept. 1976.	6 Ph.D. and 15 M.S. in progress by Fall, 1978.
D) Develop resources to conduct pilot basis short courses on specific topics involving dryland agriculture for: a) senior policy decision makers; b) junior technical personnel, either at OSU or at selected sites.	All		Course in integrated livestock-cereal production systems to be offered in late Spring, 1978.	
E) Develop special courses, workshops and conferences as needed for AID and CID personnel.	All	April 1977	Symposium on dryland agriculture in cooperation with the UC/R.	Topics: Tillage and moisture conservation; Farm implements and machinery; Crop & livestock interrelationships; Cereals & Forage production; Grazing systems; Dryland agricultural systems.
F) Establish an education, training, and research base in dryland crop production at the Sherman Branch Station near Moro, Oregon.	All	Nov. 1975 - Termination of project	Equipment needs to be specified Fall, 1975; equipment to be purchased Fall, 1975 - Spring, 1976; first applied field trials to be started Fall, 1976.	Completed training and research center for applied research and extension training.

Oregon State University

MOISTURE CONSERVATION AND UTILIZATION
IN LOW WINTER RAINFALL AREAS OF LDCs

211(d) Program

AID/ta-G-1221

WORK PLAN (Revised 3/77)

OUTPUT: #3 Research Capability and Knowledge Base will be Improved.

ACTIVITY	STAFF	START/FINISH DATES	SCHEDULED EVENTS/TARGETS	EXPECTED RESULTS
Carry out preliminary steps for on-site visit to Mediterranean.	All	Oct. 1975-Mar. 1976	Selection of team members; initial review of literature; determination of meaningful data to be collected; identification of countries and persons to be visited; schedule meeting with AID, CID and UC/R to coordinate mutual activities and share accumulated knowledge.	Written on-site visitation plan and schedule; awareness of the program of UC/R.
Prepare State-of-the-Art paper on dryland technology; sections to be included are:				
Cereal-production technology;	F.B.	Oct. 1975-Sept. 1977	Completed bibliographic review and identification of relevant literature; circulate rough drafts of various sections.	Completed State-of-the-Art paper.
Cereal-forage technology;	F.B., A.W.			
Cereal-equipment;	F.B., D.B.			
Forage-livestock;	A.W.			
Forage-livestock equipment;	A.W., D.B.			
Production economics;	J.F.			
livestock				
cereal				
Market and institutions;	J.F.			
livestock				
cereal				
Soil-moisture relations;	L.B.			
livestock				
cereal				
				NOTE Output #3 continued on next sheet.

Oregon State University

MOISTURE CONSERVATION AND UTILIZATION
IN LOW WINTER RAINFALL AREAS OF LDCs

211(d) Program

AID/ta-G-1221

WORK PLAN (Revised 3/77)

OUTPUT: #3 Research Capability and Knowledge Base will be Improved. (continued)

ACTIVITY	STAFF	START/FINISH DATES	SCHEDULED EVENTS/TARGETS	EXPECTED RESULTS
Carry out an on-site visit to the Mediterranean/ Near East region to compare existing conditions with State-of-the-Art.	All	March - May 1976	Evaluation of existing technology in the North African/Mediterranean area; countries to be visited include Morocco, Tunisia, Turkey, Iran and Pakistan.	Comparison report of existing conditions vs. State-of-the-Art.
Carry out an on-site visit to dryland areas of Australia	A.W., T.J., J.F., F.B.	Sept.-Oct. 1976	Familiarization and evaluation of Australian forage-cereal production system.	Useful contribution to knowledge of State-of-the-Art.
Develop research proposals on knowledge gap as identified by SOTA.	All	Jan.-July 1977	Develop a long term research proposal oriented toward further understanding the interrelationship between livestock and cereal production; submit proposal to AID/W by June 1977.	Completed research in one of the most important problems in dryland agriculture. The research will be multidisciplinary and fully integrated.
Serve as repository and principal institution for dissemination of knowledge with regard to dryland farming in low winter rainfall zones.	Lib.	Aug. 1975-July 1978	Determine system of collection and cataloging; obtain necessary materials through appropriate means including purchase when necessary; establish a literature search service.	Complete collection of published works; ability to send relevant materials to requesting agencies.

Oregon State University

MOISTURE CONSERVATION AND UTILIZATION
IN LOW WINTER RAINFALL AREAS OF LDCs

211(d) Program

AID/ta-G-1221

WORK PLAN (Revised 3/77)

OUTPUT: #4 Increased Advisory Capacity

ACTIVITY	STAFF	START/FINISH DATES	SCHEDULED EVENTS/TARGETS	EXPECTED RESULTS
Develop efficient advisory service to provide short-term and long-term consultants in dryland-related topics.	All	Jan. 1975 - June 1980	Initial capabilities to provide consultants to start by Jan. 1976 in dryland agronomy, soil management, agricultural economics, and weed control.	Increase competency in problem identification, analysis and design.
		July 1977	It should be noted that the agricultural economics component of the grant phases out July 1977 unless additional funding is provided.	Increase capability to assist in project operations dealing with education, research or extension.
		July 1977 - June 1980	Provide advisory and consultant service (in addition to the above) in livestock-grazing management systems and agricultural power and machinery specialties.	Increase capability to evaluate proposed and on-going programs and projects. Complete consultant and advisory service in: cereal production soil management/moisture conservation range management pest management including weed control farm management farm power and machinery management
Accept opportunities for staff to participate in special training programs, consistent with grant objectives, that are available through AID, CID and other groups.	All	July 1975 - June 1980		Improved staff response capability.
Provide for faculty exchange with other institutions or agencies.	Selected			Enlarge talent selection in pool.
Bring outside faculty to OSU to conduct seminars, workshops and conferences for staff improvement.	All	July 1975 - June 1980	Bill Wright (Rockefeller Foundation, Turkey) to discuss existing cereal forage production problems (Sept. 1975). Dr. R. J. French (Australian Dept of Agriculture) to discuss dryland research in Australia.	Staff education.

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WORK PLAN (Revised 3/77)

OUTPUT: #5 Domestic and International Linkages

ACTIVITY	STAFF	START/FINISH DATES	SCHEDULED EVENTS/TARGETS	EXPECTED RESULTS
Prior to on-site visits, a close association between CID and OSU will be established to ascertain areas where interinstitutional approaches are desirable or where existing information can be exchanged. Special emphasis will be placed on the programs at U. of A. and UC/R where complementary activities and interties can be developed.	All	Continued	Preliminary meeting with UC/R to exchange information and solicit cooperation (Oct. 1975).	Close working relationship with CID universities, especially UC/R.
Professional partnerships will be established with USAID, CID, ICARDA, CIMMYT and FAO for the purpose of: initiating personnel exchange; developing contacts in LDC's and facilitating travel; fostering faculty-student exchanges; exchanging information; planning and conducting cooperative research programs or joint advisory services; and developing common training programs both in the US and LDC's. These latter inputs will be a continuing activity conducted throughout the program.	All: (Director to have special responsibility).	Continued	Contact with many of the institutions will be made in conjunction with on-site visits.	Close working relationship with international agencies and centers.
A strong linkage with Rockefeller Foundation, Ford Foundation, USAID and ICARDA will be developed to aid in identifying and financing individuals to participate in training programs at M.S. and Ph.D. levels. FAO can provide resources and identify people to participate in short courses and training programs of longer duration.	All	Continued	Contact will be made with the institutions during on-site visits. In addition, present personal and project linkages will be strengthened.	Facilitated flow of students to OSU to participate in training programs.
Linkages also will be forged with scientists in selected LDC's where cooperative research and training can be conducted. M.S. and Ph.D. students, on returning to their respective LDC's, will remain closely associated with the total program thus establishing permanent linkages.	All	Continued	A list of LDC scientists working in dryland areas will be developed. The possibility of providing information and scientific results through a periodic newsletter or other device will be explored. Cooperative research to be initiated with local scientists through new AID/OSU contracts (July 1978).	Closely knit group, if scientists aware of the state of the art and aware of work being conducted in similar ecological zones. Active research effort in adapting existing technology and developing needed new technology.

Appendix III. Publications, Presentations, Papers, and Theses.

1976

DATC*. 1976. Review Report #1. AID/OSU 211(d) grant, Moisture Conservation and Utilization in Low Winter Rainfall Areas of LDCs. Dryland Agric. Tech. Comm., Oregon State Univ., 76 p.

DATC. 1976. Dryland Agriculture Bibliography. A list of materials on agriculture of semi-arid temperate regions. compiled by S.K. Riehl, M. Kinch, and R. Baker. Dryland Agric. Tech. Comm., Oregon State Univ., 170 p.

1977

AMBLER, J.R., T.L. JACKSON and W.E. KRONSTAD. 1977. Varietal differences in response of winter wheat to nitrogen fertilizer. Agronomy Abstracts, Los Angeles, CA.

BOERSMA, L. and T.L. JACKSON. 1977. Fundamentals of water conservation in the summer fallow system of farming. Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 219-245.

BOLTON, F.E. 1977. Investigations on rotary strip-tillage in chemical fallow for seedbed preparation and stand establishment in dryland cereals. Paper presented at the Agronomics of Conservation Tillage Conference, Great Falls, MT.

BOLTON, F.E. and D.E. BOOSTER. 1977. Tillage, moisture conservation and water use efficiency for dryland cereal production in winter rainfall regions. Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 552-588. Also pub. as: Oregon Agric. Exp. Sta. Tech. paper #4623.

BULBUL, M. 1977. A short look at some economic aspects of dry farming in Turkey (Problems of the wheat production economy). Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 480-499.

*Dryland Agriculture Technical Committee

DATC. 1977. Dryland Agriculture Bibliography. A list of materials on agriculture of semi-arid temperate regions, 2nd ed. Compiled by S.K. Riehl and R. Baker. Dryland Agric. Tech. Comm., Oregon State Univ., 484 p.

DATC. 1977. Review Report #2. AID/OSU 211(d) grant, Moisture Conservation and Utilization in Low Winter Rainfall Areas of LDCs. Dryland Agric. Tech. Comm., Oregon State Univ., 106 p.

DOOLETTE, J.B. 1977. The application of the Australian ley farming system in North Africa. Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 589-608.

FITCH, J.B. and T.L. NORDBLOM. 1977. Agricultural decision making in the drylands. Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 273-294.

HEPWORTH, H.M. 1977. The pesticide dilemma. Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 609-619.

JACKSON, T.L. 1977. Fertilizer needs for developing countries. Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 541-551.

JONES, W.O. 1977. Agricultural marketing policies for the dry lands of tropical Africa. Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 654-689.

WINWARD, A.H. and R.F. MILLER. 1977. Place of the ruminant in integrated resource management. Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 264-272.

WRIGHT, B.C. 1977. Dryland agricultural cropping systems in low winter rainfall regions. Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 246-263.

YESILSOY, M.S. 1977. Tillage and cultural practices for wheat under winter rainfall conditions in central Anatolia. Proc., International Symposium on Rainfed Agriculture in Semi-Arid Regions, Riverside, CA, 468-479.

1978

BOLTON, F.E. 1978. Precipitation during the fallow period and its effect on soil nitrogen levels in a fallow-grain rotation. Paper presented at the Pendleton-Walla Walla Fertilizer Dealers Conference, Walla Walla, WA.

DATC. 1978. Review Report #3. AID/OSU 211(d) grant, Moisture Conservation and Utilization in Low Winter Rainfall Areas of LDCs. Dryland Agric. Tech. Comm., Oregon State Univ., 70 p.

DATC. 1978. Bibliography of Dryland Agriculture, first supp. to 2nd ed. Compiled by A.E. Wolff and R. Baker, Dryland Agric. Tech. Comm., Oregon State University., 248 p.

JACKSON, T.L. 1978. Diagnostic techniques used to identify optimum levels of N fertilization for irrigated crops. Proc., Symposium, Use of N in Irrigated Agriculture, Sacramento, CA.

JACKSON, T.L. and D.M. DRLICA. 1978. Effects of stage of maturity on phosphorus and sulfur critical levels in subterranean clover *Trifolium subterraneum* L. Proc., 29th Annual Fert. Conf. of the PNW, Beaverton, OR.

JACKSON, T.L. and R.L. POWELSON. 1978. Suppression of Take-All (*Gaeumanomyces graminis*) Root Rot of wheat with fall applied chloride fertilizers. Proc., 29th Annual Fert. Conf. of the PNW, Beaverton, OR.

1979

BOLTON, F.E. 1979. Agronomic yield constraints in rainfed cereal production systems. Paper presented at the Fifth Regional Cereals Workshop, Algiers, Algeria.

BOLTON, F.E. and D.E. BOOSTER. 1979. Strip till planting in Dryland Cereal Production. Amer. Soc. Agric. Eng. paper no. 79-1530, Transactions of ASAE, in press. Also pub. as Oregon Agric. Exp. Sta. Tech. paper #5386.

CUENCA, R.H. and J.I. STEWART. 1978. Computerized evapotranspiration model using neutron meter input. Paper presented at the 6th European Geophysical Society Meeting Symposium on Evaporation, Vienna, Austria.

DATC. 1979. Dryland Agriculture in Winter Precipitation Regions of the World. Status of the Technical Art. Dryland Agric. Tech. Comm., Oregon State Univ., 218 p.

DATC. 1979. Review Report #4. AID/OSU 211(d) grant, Moisture Conservation and Utilization in Low Winter Rainfall Areas of LDCs. Dryland Agric. Tech. Comm., Oregon State Univ., 47 p.

DRLICA, D.M. and T.L. JACKSON. 1979. Effects of stage of maturity on phosphorus and sulfur critical levels in subterranean clover. Agron. J., 71:824-828.

ENGLISH, M.J. and G.T. ORLOB. 1979. Managing return flows by scientific scheduling of irrigation. Paper presented at joint conference on the Agriculture Industry and its effects on water quality. Also pub. in Prog. Wat. Tech., Pergamon Press, U.K., vol. II, no. 6, p. 405-414.

JACKSON, T.L. 1979. Fertilization of western Oregon pastures. Summary of Reports, 1979 Sheep and Wool Day. Oregon Agric. Exp. Sta. Special Report 539. Corvallis, OR, 19-25.

1980

BOLTON, F.E. and D.M. GLENN. 1980. Precipitation variation and nitrogen requirements of dryland winter cereals: a proposed moisture-nitrogen-yield management tool. Int'l. Cong. on Dryland Farming, Working Papers, vol. I., Adelaide, SA, Australia, 67-71.

BOOSTER, D.E. and F.E. BOLTON. 1980. A strip-till-plant system for direct seeding of dryland cereals. Int'l. Cong. on Dryland Farming, Working Papers, vol. I, Adelaide, SA, Australia, 131-133.

CHRISTENSEN, N.W. 1980. Chloride effects on winter wheat water potentialis as related to disease severity, presentation at Soil Science Seminar, Corvallis, OR.

DATC. 1980. Bibliography of Dryland Agriculture, third ed., compiled by S.M. Khan, R. Baker, S.K. Riehl, and A.E. Wolff, 2 vols., Dryland Agric. Tech. Comm., Oregon State Univ.

KIEMNEC, G. and T.L. JACKSON. 1980. Yield and sulfur uptake in subterranean clover as influenced by rate and source of sulfur. Paper presented at the Western Soil Science Society meeting, Davis, CA.

MEE, C. and R.F. MILLER. 1980. The effects of variety, seasonal variation and site production potential on forage quality of cereal aftermath. Proc., Int'l. Cong. on Dryland Farming Working Papers, vol. II, Adelaide, SA, Australia, 83-85.

MILLER, R.F. and G.B. DONART. 1980. Response of Muhlenbergia porteri to season of defoliation. Paper presented at Int'l. Cong. on Arid and Semi-arid Zones, La Serena, Chile.

MILLER, R.F. and C. MEE. 1980. Forage quality of cereal aftermath. 1980 Prog. Rep. - Research in Rangeland Management. Oregon State Univ. Exp. Sta. Spec. Rept. 586, 13-16.

NORDBLOM, T.L., S.F. MILLER, and D.M. GLENN. 1980. Long run management of a cow/calf enterprise integrated with dryland cereal farming and rangeland resources: a systems simulation model. Int'l. Cong. on Dryland Farming, Working Papers, vol. II, Adelaide, SA, Australia, 126-128.

DRLICA, D.M. "Effects of stage of maturity on phosphorus and sulfur critical level in Trifolium subterraneum L."

GLENN, D.M. "Precipitation variation and nitrogen requirements of winter wheat in a fallow-crop rotation under dryland conditions: a proposed moisture-nitrogen fertilizer-grain yield management model."

HENDERSON, R.L. "Available soil moisture in a fallow-winter wheat rotation under five precipitation regimes simulated in the field."

KIEMNEC, G. "Sulfur fractions and N/S ratios of Subterranean clover (Trifolium subterraneum L.) as affected by sulfur fertilization.

MEE, C. "Effects of site potential, season and plant part on the quality and yield of cereal aftermath."

NOORIFARD, F. "The effect of starter fertilizer on the germination, emergence, stand establishment, and grain yield of winter wheat grown under dryland conditions."

NORDBLOM, T.L. "Demographic pulse hypothesis of the U.S. cattle cycle."

PETRIE, S. "Seasonal distribution of forage production, N concentration, and Mo concentration in subterranean clover," (MS). "Effects of N source and placement on Mn uptake by barley, oats, and wheat on high pH soils," (Ph.D.).

SENEL, A.H. "Rate of nitrogen mineralization and the accumulation distribution and loss of nitrate nitrogen in the soil profile under variable levels of precipitation during the fallow period in fallow-winter wheat rotation."

SULLIVAN, D. "Effects of P fertilization on grain yield, P uptake, and leaf P concentration of winter wheat."

PETRIE, S.E. and T.L. JACKSON. 1980. Effects of N source and method of application on vield and Mn concentration in oats and barley. Paper presented at the Western Soil Science Society meeting, Davis, CA.

SULLIVAN, D. and T.L. JACKSON. 1980. Phosphorus response of winter wheat varieties in Western Oregon. Paper presented at the Western Soil Science Society meeting, Davis, CA.

TAYLOR, R.G., T.L. JACKSON, and R.L. POWELSON. 1980. Effect of planting date, form of nitrogen, soil pH and chloride on Take-All root rot of winter wheat. Paper presented at the Western Soil science Society meeting, Davis, CA.

WINWARD, A.H. 1980. Use of ruminants as a management tool. Int'l. Cong. on Dryland Farming, Working Papers, vol. II, Adelaide, SA, Australia, 86-88.

1981

MEE, C., R.F. MILLER, and W.C. KRUEGER. 1981. Forage quality and yield of leaves, chaff and stubble of cereal aftermath on different site potentials. To be submitted, J. Agronomy.

MEE, C., R.F. MILLER, and W.C. KRUEGER. 1981. The effect of site potential and season on quality and yield of cereal aftermath. To be submitted, J. Agronomy.

NORDBLOM, T.L. and D.M. GLENN. 1981. "Simulation Model for Testing Fertilization Strategies for Dryland Wheat, With and Without the Use of Crop Residue for Beef Cow Winter Feed." To be submitted, Am. J. of Ag. Econ.

Theses

CAREY, A. "The influence of precipitation and fertilization on cereal aftermath."

TAYLOR, R. "Effects of chloride and other fertilizer and management practices on severity of Take-All root rot of wheat."

Appendix IV. Sample Search of Computerized Dryland Data File

Computer Searching of the Bibliography of Dryland Agriculture, 3rd Edition, Vol.1 Bibliography

The Bibliography of Dryland Agriculture, 3rd Edition, Vol.1 Bibliography is in machine (i.e. computer) readable form stored on magnetic tape in a format compatible with the Famulus' database management system on a CDC CYBER 720 with the NOS Version 1 operating system (1). The database may be searched for information requests using the Famulus search capability and an interactive front end system developed at OSU. The retrieval process can be broken down into the following components:

1) the information request is analyzed,
2) the request is translated into "searchable terms",
3) the "search strategy" is developed, and
4) the strategy is entered into the computer via the interactive Famulus front end system (2).

In order to retrieve relevant information from any computer-based information system, the searcher/requester must analyze the request by

1) obtaining information that is specific and unambiguous, and
2) identifying key concepts in the request.

The searcher/requester must, therefore, define the request with these ends in mind. In addition to the 'search interview' technique, a knowledge of the data base is important for retrieving a comprehensive set of relevant citations.

The intent of this appendix is to show the computer searching capability for a simple request, some of the interactive options used and samples of the search results.

The first search request is 'what citations in the Bibliography contain information on soil in Australia ?'. By looking in the Subject Index, Vol.2 we see that there are about 11 pages of titles with the descriptor Australia in the descriptor field or about 600 citations. Under soil in the index there are 38 different soil terms used and 20 pages of titles (approximately 1000 titles). We could compare the titles under Australia and soil terms for matches but this would require much tedious work. The computer will be used to obtain this result with an added dimension: we will search the title and descriptor fields for AUSTRALIA and SOIL.

---

(1) Famulus : A Personal Documentaion System User's Manual. Pacific Southwest Forest and Range Experimental Station. 1962

(2) Employment and Training Automated Information Retrieval System (ETAIRS) User's Manual. Institute for Manpower Studies, Oregon State University, September 1979.

The following illustrates entering the search request (i.e. search the database for AUSTRALIA and SOIL in the title or descriptor fields) for a night search (run after 11PM) and the results stored on a file (i.e. 3501505) online for review or additional searching:

```
HELLO - WELCOME TO INTERACTIVE FAMULUS (VERSION 2.4)

CHOICES: SEARCH, RETRIEVE, CHANGE, MAIL, HELP, END ? S
ENTER DATABASE NUMBER OR NAME: ? 1

IDENTIFICATION OF DATABASE 1
  BIBLIOGRAPHY OF DRYLAND AGRICULTURE

FIELDS ARE
   (T,Y,A,C,P,D,L,N)

DATE OF LAST UPDATE:  100180
NUMBER OF RECORDS:     4728

OPTIONS:  1)  IMMEDIATE SEARCH
          2)  NIGHT SEARCH

ENTER CORRESPONDING NUMBER OR -CR-? 2
PLEASE ENTER YOUR PASSWORD ?

ENTER THE TITLE TO APPEAR ON THE LISTING:
? LIBRARY OSU/ BOB BAKER

ENTER FIELDS TO BE SEARCHED:
? T,D

ENTER SEARCH STRATEGY (&=AND, !=OR, ↑=NOT) :
? AUSTRALIA&SOIL

THE SEARCH WILL BE PERFORMED TONIGHT

OUTPUT WILL BE ON FILE - 3501505
(DAY-350  HOUR-15:05)
```

This search could have been run immediately (i.e. as soon as the tape could have been mounted) but was run at night at a reduced rate since urgency was not required. The next day the search result (i.e. file 3501505 with 99 citations) is looked at as the following illustrates. The first three and last two (i.e. 1-3,98,99) citations are listed (only the first and last are shown in the example).

```
HELLO - WELCOME TO INTERACTIVE FAMULUS (VERSION 2.4)

CHOICES: SEARCH, RETRIEVE, CHANGE, MAIL, HELP, END ? R
ENTER DATABASE NUMBER OR NAME: ? 3501505
```

```
OPTIONS: 1) SEE THE RECORDS AT YOUR TERMINAL
         2) PRINT THEM ON THE OSU LINE PRINTER
         3) DISCARD THE RESULTS OF A SEARCH
         4) COUNT THE NUMBER OF RECORDS
         5) RETURN TO CHOICES  (-CR-)

ENTER CORRESPONDING NUMBER OR -CR- : ? 4

FILE 3501505 CONTAINS   99 RECORDS

ENTER CORRESPONDING NUMBER OR -CR- : ? 1

WHICH FIELDS WOULD YOU LIKE LISTED?

WHICH CITATIONS WOULD YOU LIKE LISTED?

? 1-3,98,99

   1  T    AGRICULTURE IN SOUTH AUSTRALIA, YORKE PENNINSULA.
      Y    1965
      A    WINN, D.B.
      C    J. AGRIC. SOUTH AUST.  VOL. 69
      P    P. 2-17
      D    WHEAT PRODUCTION, SOILS, MAPS, AUSTRALIA
      L    S17/S7
      N    2358
:
  99  T    WHITE CLOVER RESPONSES TO PHOSPHORUS AND SULPHUR ON
             GRANITE SOILS.
      Y    1976
      A    HOLFORD, I.C.R.; GLEESON, A.C.
      C    AUST. J. EXP. AGRIC. AND ANIMAL HUSB.  VOL. 16
      P    P. 234-239
      D    TRIFOLIUM REPENS, PLANT GROWTH, PHOSPHORUS, SULFUR,
             FERTILIZATION, SOILS, AUSTRALIA
      L    S3/A9
      N    2738

PROCESSING COMPLETE
```

After finding out there are 99 citations with AUSTRALIA and SOIL (any soil term or SOILS) the decision is made to narrow the search by asking for only those citations from file 3501505 that have the term POTASSIUM in the title or descriptor field (i.e. result will be AUSTRALIA and SOIL and POTASSIUM) which in the following is one citation in file 3511522.

```
CHOICES:  SEARCH, RETRIEVE, CHANGE, MAIL, HELP, END ? S
ENTER DATABASE NUMBER OR NAME: ? 3501505

OPTIONS: 1) IMMEDIATE SEARCH
         2) NIGHT SEARCH

ENTER CORRESPONDING NUMBER OR -CR-? 1
```

```
 ENTER FIELDS TO BE SEARCHED:
? T,D

 ENTER SEARCH STRATEGY (&=AND, !=OR ↑=NOT) :
? POTASSIUM

  99 RECORDS SCANNED              1 RECORDS RETRIEVED

 OUTPUT IS ON FILE - 3511522
 (DAY-351 HOUR-15:22)

 END OF SEARCHING

 OPTIONS: 1) SEE THE RECORDS AT YOUR TERMINAL
          2) PRINT THEM ON THE OSU LINE PRINTER
          3) DISCARD THE RESULTS OF A SEARCH
          4) COUNT THE NUMBER OF RECORDS
          5) RETURN TO CHOICES (-CR-)

 ENTER CORRESPONDING NUMBER OR -CR- : ? 1
 WHICH FIELDS WOULD YOU LIKE LISTED?

 WHICH CITATIONS WOULD YOU LIKE LISTED?
? 1

    1  T     THE BUILD-UP OF AVAILABLE POTASSIUM UNDER SUBTERRANEAN
               CLOVER PASTURES ON A PODZOLIC SOIL.
       Y     1960
       A     WILLIAMS, C.H.; LIPSETT, J.
       C     AUST. J. AGRIC. RES.  VOL. 11
       P     P. 473-484
       D     TRIFOLIUM, POTASSIUM, AUSTRALIA, SOIL FERTILITY
       L     S17/A9
       N     2216

PROCESSING COMPLETE
```

Searching can be done on any or all fields. The Boolean operators AND, OR, NOT may be used in the search strategy. Search results may be limited by using the date field (Y) to get only items published since 1970 or by using the publication field (P) to ask for only articles in a particular journal.

Searching and search results may also be initiated and accessed via terminals with an acoustic coupler from any remote site that has telephone service. For more information contact Robert S. Baker, Library, Oregon State University, Corvallis, Oregon 97331 / USA; telephone: (503) 754-3558.

Appendix V. A Selected List of Short-Term Visitors

Name	Country
Mrs. Sarada Ojha (FAO Fellow)	Nepal
Solomon Bellete	Ethiopia
Prof. B. Ristevski	Yugoslavia
Edilberto Possamai	Brazil
Luciano Gomes	Brazil
Benedito de Souza	Brazil
Gloria Fernandez	Brazil
Christopher Norris	Australia
Lindsay Ward	Australia
Maxwell Middleton	Australia
Allan Elwood	Australia
Kamel Belkhodja	Tunisia
Moncef Ben Said	Tunisia
Ali Ben Zaid Salmi	Tunisia
Yilmaz Akar	Turkey
Charles Poulton	FAO
Michael Mapunda	Tanzania
Raynald Mrope	Tanzania
Peng Yew Tan (FAO Fellow)	Malaysia
Kutlu Somel	Turkey
Mr. & Mrs. Ramiro Andrade	Brazil
Mr. & Mrs. Adimir Henning	Brazil
Jans Nannerup	Denmark
Zenon Muszynsky	Poland
Mehmet BulBul	Turkey
Mohamed StaM'Rad	Tunisia
Elizabeth Nettey	Ghana
Sanaa El Sayed	Egypt
Fleur de Lys O. Torres	Philippines
Fatima Hussien Al-Hamdani	Yemen
Aina Hussien Al-Fadly	Yemen
M. Sefik Yesilsoy	Turkey
Paul Marko	Mexico
Bill Wright	USA

Name	Country
Wade Reeves	Nigeria
Krishnan Singh	India
Zohor Rosen	Israel
Adman Shihabe	Syria
Ahmed Moussa el ali	Syria
Abdullah M'Sahi	Morocco
Jorge Elias Neto	Brazil
M.L. Parkipuny	Tanzania
Mike Prescott	Turkey
Peter Portman	Australia
Robert Redden	Nigeria
Dawit Degufu	Ethiopia
Yusuf Ergun	Turkey
Polat Solen	Turkey
M. Mohamed Mostefa Boukhezer	Algeria
E.M. Matheson	Australia
Baruch Retig	Israel
Sar Shalom Yigol	Israel
Josef Weisz	Israel
Zvi Shekel	Israel
Hugh Reimers	Australia
Hikmat Nasr	Lebanon
Jerry Grant	Ecuador
Robert Havener	Mexico
Borje Hedman	Sweden
N.C. Joshi	India
Art Klatt	Ecuador
Larbi Meziani	Algeria
R.G. Anderson	Mexico
David Ariel	Israel
Faik Bahhady	Syria
Menouar Batata	Algeria
Adda Besseghieur	Algeria
R.B.L. Bhardwaj	India
N.E. Borlaug	Mexico

Name	Country
Houari Bouhafs	Algeria
A. Daaloul	Tunisia
Harry Darling	Lebanon
John Doolette	Syria
Jamal Fuad	Libya

Appendix VI. Equipment to Implement Grant Activities.

Located at Moro, OR (dryland training/research site)

Soil coring apparatus
Fertilizer spreader (8 ft.)
John Deere tractor (track-layer)
Chisel plow
Disk
Subsoiler
Oyjord seeder
Drillframe with packer wheels, openers
Dry fertilizer box
Tractor-mounted sprayer
Mettler balance
Drying oven

Located at Oregon State University, Corvallis, OR

Bolens Husky tractor (old, used)
Digital recorder with scanner

Appendix VII. Individuals in Advanced Degree Programs Receiving Support from the 211(d) Grant

student	country	degree	department
A. Belaid	Algeria	AgM	Crop Sci.
M. Benmoussa	Algeria	AgM	Crop Sci.
A. Carey	U.S.	M.S.	An. Sci.
D. Drlica	U.S.	M.S.	Soil Sci.
J. Estes	U.S.	M.S.	Crop Sci.
D.M. Glenn	U.S.	Ph.D.	Crop Sci.
R.L. Henderson	U.S.	M.S.	Crop Sci.
G. Kiemnec	U.S.	Ph.D.	Soil Sci.
C.S. Mee	U.S.	M.S.	Range
F. Nooriford	Iran	Ph.D.	Crop Sci.
T.L. Nordblom	U.S.	Ph.D.	Ag. Res.
S. Petrie	U.S.	M.S. Ph.D.	Soil Sci. Soil Sci.
M. Russelle	U.S.	M.S.	Crop Sci.
A.H. Senel	Turkey	M.S.	Crop Sci.
D. Sullivan	U.S.	M.S.	Soil Sci.
R. Taylor	U.S.	M.S.	Soil Sci.