

AGENCY FOR INTERNATIONAL DEVELOPMENT
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BIBLIOGRAPHIC INPUT SHEET

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Batch # 34

1. SUBJECT
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FICATION

A. PRIMARY

Serials

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B. SECONDARY

Agriculture--Plant production--Semiarid zone

2. TITLE AND SUBTITLE

Moisture utilization in semi-arid tropics, summer rainfall agriculture; annual report, 1974/1975

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(101) Calif. Univ., Riverside

4. DOCUMENT DATE

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5. NUMBER OF PAGES

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211(d) Annual Report

Date Due: September 1, 1975

Date: October 15, 1975

Grant Title: MOISTURE UTILIZATION IN SEMI-ARID TROPICS:
Summer Rainfall Agriculture

Grantee: University of California, Riverside

Grant Program Director: Dr. Glen H. Cannell

AID Sponsoring Technical Office: Technical Assistance Bureau/Agriculture

Statistical Summary:

Period of Grant	June 20, 1974 to June 19, 1979
Amount:	\$1,000,000
Expenditures for Report Year:	\$91,336
Accumulated Expenditures:	\$91,336
Anticipated for next year:	\$265,975

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I Narrative Summary

A. Accomplishments

1. Reporting Year

A computerized bibliographic information base on dryland farming has been established which gives access to a rapidly growing collection of material. At present there are over 2000 entries in the data base. Access to these entries may be made by title, author, subject, organization/affiliation and geographical location. Although the information base is far from complete, we can at this time provide some useful information to outside users. Since the project is centered on semi-arid tropics, this bibliography should be of particular interest to the Sahel LDC governments and universities being established in the area as a base for establishing library and other collections. It will be useful to researchers in the semi-arid tropics as a ready reference and updating of new information. An established program of significant meetings bringing together the 211(d) grant directors as part of CID has helped. Exchange of information among the 211(d) universities was begun early in the grant year and this has been extended to a significant meeting in September to develop an information network among the 211(d) universities, establishing a strong linkage for cooperative activities. These ties have been further strengthened by interaction with the Tropical Soils Consortium through exchange of committee members at various meetings and by AID/W in bringing both groups together for workshops.

2. Life of Grant

Accumulated accomplishments in the Centralized Information System and progress in establishing a worldwide talent bank and information linkage system are well within the framework of the time sequence of the grant. Purchase of library materials to support the project will be increased during the next year; many of these were on requisition during the current fiscal year. With respect to developing the State of the Art (SOTA), we are on schedule with reference to the life of the grant. Plans are to complete the SOTA during the second year of the grant; publication of the SOTA has been arranged with Springer-Verlag publishers as part of their Ecological Studies Series. The project's research capabilities are beginning to accumulate. A team trip into the Sahel region that began in mid-June has stimulated interest and has helped define some research areas. Two U.S. graduate students were brought into the program in the Spring quarter and they are now beginning research projects. The research program in terms of the grant timing sequence should be highly productive following completion of the SOTA, when established research areas can be accurately determined. Advisory and training of our staff was started early in the grant year with seminars by individuals with considerable knowledge of the Sahel and other semi-arid tropic regions. This was supplemented by the compilation of material pertinent to the team's trip into Africa and was supported by the use of films from that region. These and other activities will be increased during the life of the grant. Significant progress in the development of a curriculum to support the training of graduate students has been developed early in the grant program. A graduate course in computer modeling that relates directly to the Sahel area was initiated during the Winter quarter, wherein students develop simulation models using climatic and crop yield data obtained from semi-arid regions of the tropics. Plans for the following year are to apply a model developed in this course to an area in the Sahel.

II. DETAILED REPORT

A. General Background and Description of Problem

Hunger and malnutrition have been two of the greatest problems confronting humanity since the dawn of mankind. The need to solve the world's food problems has been increasingly recognized during the twentieth century. Agencies of the United Nations, governments of developed nations, private foundations, and research institutes have done much to improve food production and alleviate hunger. Among significant breakthroughs were hybrid corn in the 1930's; grain sorghum, pearl millet and hybrid monogerm sugar beets in the 1950's; and the Green Revolution which introduced new wheat and rice varieties in the 1970's. Yet all of these achievements have constituted only a few small steps in the fight against hunger.

At present almost 85 percent of the presently cultivated lands of the world depend entirely upon precipitation to supply soil moisture for plant growth. The Sahelian and Soudanian zones of Africa, where acute drought conditions have resulted in great human suffering in the past few years, have refocused attention on the urgent need for developing new programs to make underdeveloped or marginal lands productive and to reclaim deteriorating grasslands. The potential for increasing crop production and restoring grasslands in these regions of Africa and solving similar problems in many other semi-arid areas of the world involves the essential component of water management. Although considerable attention has been given to development of crop varieties and agricultural practices under adequate moisture conditions, research leading to the development of an arid-farming technology for LDCs has been virtually non-existent. Principles and practices developed for irrigated agriculture in the United States cannot be simply transported to other regions of the developing world for many reasons. If farming productivity in

these regions is to be increased, then it will be necessary to employ integrated systems approaches to developing crop management practices for specific crops and soil and climatic conditions. Such practices must make efficient use of available resources (such as precipitation, fertilizers, level of mechanization, etc.) and they must be economically and culturally feasible for application in the LDCs.

Given this perception of the problem and the direction that work toward a solution of it must take, the University of California, Riverside, was able to measure its ability to work toward that solution. The University of California, Riverside, through its Citrus Research Center and Agricultural Experiment Station has been continuously involved since 1907 in problems related to research and management of agriculture in arid or semi-arid lands. The Agricultural Experiment Station has as one primary mission the development of knowledge of plants of importance to agriculture in semi-arid tropical climates. This mission related primarily to agricultural production in semi-arid southern California, but the AES has acquired an international reputation in sub-tropical horticulture and semi-arid land crop production that goes back to the early 1920s. Members of its research staff are involved in many international organizations relating to agriculture and have served frequently as consultants in many foreign lands.

It was evident that UCR already had strength in this area, and could increase that strength with support of the grant. Other aspects of UCR's present strength and capacity for growth included:

- (1) Instructional Resources: The University of California, Riverside, with its various divisions and colleges, offers a solid core of academic courses, and degrees in sixty-six majors. Of particular strength is

the College of Natural and Agricultural Sciences. Two hundred twenty-nine staff members of the Agricultural Experiment Station hold appointments with the College of Natural and Agricultural Sciences, and thus share their expertise in crop production, soil-water problems, pest management, plant-disease protection, pollution problems and other research areas related to semi-arid ecosystems. The University already offers a variety of multidisciplinary degree programs, setting a valuable precedent for new programs of this type which would deal more specifically with grant-related topics.

To complement and enlarge its present Instructional Resources, the University, under the 211(d) grant, proposes to: (1) increase the graduate program and to add an international dimension in dryland farming. Efforts would be made to increase the number of students from LDCs in the field of dryland farming; (2) initiate Outreach Training Programs, short term courses designed for LDC personnel; (3) special non-degree programs designed to train groups for work in semi-arid tropical regions of the LDCs.

(2) Research Resources: Staff members will be encouraged to devote research efforts to grant-related projects. In the course of the State of the Art review, specific problem areas will be identified and research projects undertaken. These research projects will include dissertation research by graduate students as well as staff research.

(3) Informational Resources: The UCR Library has a collection of over one million volumes in open stack arrangement. One of its specialized branches is the Bio-Agricultural Library, which contains an outstanding

collection of more than 70,000 books related to agriculture, sub-tropical horticulture and the biological sciences. It currently receives some 1,900 serial publications, and a computerized retrieval service facilitates literature searches in the sciences. Under the grant, the UCR Library will enlarge its collection in the topics of agriculture in the semi-arid tropical regions, geographic, social and cultural works on the Sahel area of West Africa, and all related material to grant problems. This collection will be recorded on a computerized data base that will provide quick and easy access to any of the material through indexes of title, author, subject and geographic area.

(4) Consulting Services: Already experienced in consultation services, the staff of the Experiment Station and the College of Natural and Agricultural Sciences will increase its expertise in problems of the semi-arid tropics to provide a core of personnel available for advisory tasks for the LDCs.

B. Purpose of the Grant

The grant will be used by UCR to develop an institutional response capability to deal with dryland moisture conservation, utilization, and farming problems in arid and semi-arid tropical regions in developing countries with summer rainfall. This capability will require building a core of experienced faculty with expertise in advising and training, knowledge of the research field, and the ability to implement adaptive research or training programs in the LDCs and contribute to upgrading LDC capabilities for improved crop production and moisture utilization through integrated crop-management systems. As an outgrowth of the proposed program, UCR can be expected to become a center of U.S. competence in dryland farming for arid and semi-arid tropical regions.

C. Objectives of the Grant

1. Objectives Restated

The proposed program will strengthen the competence of UCR in selected areas of knowledge and improve its communications with appropriate institutions here and abroad so that an institutional response capability can be achieved in dryland farming in arid and semi-arid tropical regions. The three primary thrusts in strengthening UCR's competency will be as follows:

- (1) Improvement of UCR's understanding of the current status of present and proposed practices in moisture conservation and utilization in dryland farming and their applicability to LDCs in semi-arid tropical regions. This will include an improved understanding of dryland farming systems and environmental conditions in the LDCs.
- (2) Development of mechanisms which make possible effective interdisciplinary research, advisory and extension capabilities relating to dryland farming.
- (3) Improvement of educational capabilities at UCR for students and staff to acquire greater knowledge of the principles and practices of dryland farming throughout the world.

The time sequence of activities related to the grant objectives at this time is moving at a rate compatible with the outputs. More emphasis is being placed on involving French researchers from the Sahel in the State of the Art Report and in project activities. At this point early in the grant the objectives are adequate to meet this emphasis.

2. Review of Critical Assumptions

Assumptions were made that will have a negative impact on the productivity of the proposed program if they should prove to be incorrect. The assumptions are as follows:

Assumption No. 1. It is assumed that AID/W will provide assistance in the initiation of linkages with the LDCs, in identifying training needs of institutions and individuals and sites for cooperative activity in the LDCs, and in the exchange of information as part of the linkage network.

Assumption No. 2. It is assumed U.S. and LDC institutions will cooperate with UCR in regard to the initiation and strengthening of linkages, exchanges, and visits by staff and students, information exchange, and other cooperative activities.

Assumption No. 3. It is assumed increasing numbers of students both from the U.S. and the LDCs will be interested in graduate programs at UCR and the educational offerings that are relevant to dryland agriculture in low rainfall regions of the world.

III. ACCOMPLISHMENTS

General or Introductory Statement

A team concept is being used to achieve each objective/output in the grant program. It was decided to use this approach as a means of developing an interdisciplinary relationship among faculty involved in the program. This method has been used effectively in programs in agricultural research and has simply been extended to other areas. The teams were selected during the first two weeks of the program and guideline materials were also developed. The teams have been active in developing programs to satisfy each objective/output in terms of meeting the time sequence of the grant. The teams are identified as follows: 1) Information Resources Team - responsible for objective/outputs #1 and 2; 2) Research Team - responsible for objective/output #3; 3) Educational Training and Advisory Team - responsible for objective/output #4; and 4) Curriculum and Development Team - responsible for objective/output #5.

A. Objective/Output #1 Central Information System

1. Narrative Description

The Information Resources Team identified two major targets for the term of the grant within this desired objective/output: (1) to provide Project team members with the information needed for them to prepare a State of the Art Report, and to embark on the individual research projects which will constitute their work in the overall Project, and (2) to establish at UCR an information center on agriculture in the semi-arid tropics. This latter target would make existing information, as well as the results of the Project research, accessible to interested researchers and other groups the world over.

It was decided by the planning team of the UCR Libraries, working with the Project Director, to compile a bibliography in the form of a computerized bibliographic data base, using TRIM (Technique for Report Index Management), a program developed by Everett Wallace of the UCR Library Systems Department. In the early months of the Project, members of the regular library staff devoted considerable time to preliminary exploration of material available. Meanwhile, a full-time professional librarian who combined the necessary background, language skills and experience was recruited. In January 1975 the present Project Librarian was hired. At that time a full-time Library Assistant III was also hired, along with a staff of five part-time student assistants. This staff of student assistants has fluctuated in size during the reporting year.

It was decided from the beginning that the Project would not undertake to set up a special library, and that the materials collected would be acquired and catalogued through usual Library procedures, and be integrated into the UCR Libraries' collection. However, it was also understood that some types of material would be inappropriate for incorporation into the collection, and that others would be desired and needed by Project staff for frequent consultation. This kind of material, comprising bibliographies, unbound reports, sheet maps, dictionaries, handbooks, reprints and duplicates of items already in the UCR collection, are housed variously in Project members' offices, in the office of the Project Librarian, and, in the majority of cases, in the Project Reading Room. All items housed in the Project Reading Room are entered onto the data base, and are processed with accession numbers, bindings, and library card pockets. Provision will be

made, at a later date, for incorporation of this material into the main collection, so that it will constitute, along with the other materials on the data base, a permanent collection to support research in agriculture of the semi-arid tropics.

2. Targets for the Reporting year

To initiate the MUSAT:SRA data base by:

- a. scanning the materials already held in the UCR collection (serials and monographs) for relevant citations.
- b. identifying through bibliographies, catalogs, publication lists and other data bases material for inclusion.
- c. tailoring the TRIM program for MUSAT use, including the development of a subject thesaurus.
- d. undertaking acquisition of material.
- e. establishing wide ranging linkages with other individuals and organizations with similar interests.
- f. organizing information from correspondence files into a computerized directory of persons and organizations having expertise in agriculture in the semi-arid tropics and/or African agricultural development.
- g. providing reference assistance and other research aids to Project members, graduate students and other persons using the data base and collection.
- h. to provide reference assistance in response to requests from outside the University, especially those from LDCs.

The magnitude of accomplishment of these targets depends largely on the nature of the target itself. For target a, a complete scanning of UCR material was scheduled within the reporting year, with arrangements to be made for regularly updating the scanning as new material was acquired. Adjustment of TRIM to project needs--target c--was judged to be a short term project which could be expected to be completed within the reporting year, although the thesaurus by its nature would have to remain flexible. Organizing the directory (f.) is another quantifiable task; however, given the range of other targets, it was expected only to make a beginning at fulfilling this target. The remaining targets are ongoing in nature. Each bibliography may lead to others in target (b) as the establishing of one linkage may lead to others. Reference tasks and acquisitions are continuous library procedures.

Assumptions were made in the drawing up of these targets that would have a negative impact if they should prove to be incorrect. The assumptions were as follows:

- (1) It is assumed that U.S. and LDC institutions will cooperate with UCR in regard to the initiation and strengthening of linkages, exchanges, and visits by staff and students, information exchange and other cooperative activities.
- (2) It is assumed that existing University staff and facilities will be able to absorb increased workloads from Project tasks (i.e. keypunching, acquisitions, cataloging), or that Project funds can be used to augment these facilities as needed.
- (3) It is assumed that material ordered and requested for the collection will prove available.

The means of verifying progress made in this category might include on-site visitation, actual data storage and retrieval documentation, the Annual Report and descriptive articles recently submitted for publication by the Project Librarian. (Quarterly Bulletin of the International Association of Agricultural Librarians and Documentalists; Agricultural Libraries Information Notes; paper presented at the CID workshop on Information Networking, Tucson, 22-25 September 1975).

3. Accomplishments

a. Accumulative

The current reporting year represents the first year of the Project.

b. Reporting year

A systematic scanning of the UCR holdings in selected journals was undertaken. These comprised over 210 journals in fields of agriculture, soil science, plant science, agricultural engineering, agricultural economics, anthropology, African Studies, meteorology, and other relevant disciplines. This task has now been completed, although occasionally a new journal is suggested to the Project Librarian. A student assistant has been assigned the task of checking currently received journals for updating the data base in this respect. Monographic series have been scanned in much the same way. The monographic and government publication holdings of the UCR collection have been scanned through use of the subject catalogs. The public catalog is routinely checked for selected items on bibliographies, so that the UCR collection, both serials and monographs, is assured of thorough documentation in the MUSAT data base.

Relevant indexing services, bibliographies and data bases, including those available through Lockheed & SDC, were thoroughly checked for selection. A large-scale mailing of form letters describing the project and asking for bibliographies, publication lists and suggestions was undertaken, using names and addresses listed in Patricia Paylore's Arid-Lands Research Institute: a world directory^{1/}, along with a number of addresses from other sources. Several months later a similar letter, with an enlarged brochure describing the data base was sent out to African Studies programs, libraries with Africana collections, and a number of other organizations. This tactic proved very profitable, both in establishing linkages (to be discussed in the next section) and in expanding the sources to be explored for inclusion in the data base.

The program TRIM is specifically designed for bibliographic data bases, and for use by staff which are not necessarily trained in computer input techniques. The major change that was made by the Project Librarian was the addition of another sortable information field, that of geographic location, along with minor changes in the format of the citation cards and the handling of input sheets for keypunching. A thesaurus was developed by the Project Librarian to provide a coherent system of subject headings. This was set up first from a scanning of several hundred articles for key words and from faculty familiar with scientific terms. As the subject matter of the collection has grown, this thesaurus has been subject to frequent revision. It was decided to include on the data base material on the social, cultural and geographic aspects of the Sahel area. This latter decision was taken to provide Project members traveling and planning to work in the Sahel with sufficient background for an efficient adjustment to the locale, as well as

^{1/} Paylore, Patricia. Arid-Lands Research Institutes: a world directory. Tucson, 1967, University of Arizona Press.

a thorough understanding of the existing social and agricultural systems of the peoples of that area.

The data base now contains 2124 entries, with 500 entries in process and approximately 3000 more in preparation. It is indexed by author, title, subject, source, geographic location and, where appropriate, the organization or affiliation of the researcher. The data base is accessible either through consultation of the printout--which serves as a book catalog to the collection-- or through computer searches on the index fields, or any combination thereof.

Procedures for ordering, acquisition and cataloging of MUSAT materials have been devised by consultation between the Project Librarian and the staffs of the appropriate departments within the UCR Library. Although dealing with foreign publishers, government agencies and dealers--especially those in the LDCs--gives some problems, acquisitions and cataloging are now working smoothly. Two hundred thirty-nine orders have been received and 430 are still outstanding. One hundred forty-two items have been received on interlibrary loan, with 128 still outstanding. Two hundred forty-one gifts have been received. Because a great deal of the material collection is in French, two translators will be called upon as needed in future months. Articles selected for general and specific interests have been translated, as have tables of legends for maps and soil classification systems. A glossary has been compiled that will aid researchers with some basic reading knowledge of French to use a majority of the material available without necessitating full translations. A full translation service will be made available upon request of any Project member.

Worldwide linkages were established through the mailings described above, and their follow-up correspondence. These contacts will be recorded in a computerized directory using TRIM. The citation card has been designed

so that the directory will be sortable by name, organization, location, geographic area of interest, and subject field. Information from correspondence files has been transferred to cards. These cards are still in the process of being edited and completed. It is expected that the directory will go on computer in the coming year.

The Project Reading Room has been increasingly used over the past months by Project staff, their research assistants, graduate students and visitors. It now houses 1300 items. A number of information requests from off campus (listed in Table III-A) have been fulfilled. The present staff has been trained in various levels of response to reference questions and effort is made to make all parts of the Reading Room arrangements self-explanatory.

c. Total Expenditures

Expenditure for the reporting year was \$10,912.47, which includes book purchases , TRIM support, on-line searching, and training of staff.

B. Objective/Output #2 Network of Worldwide Linkages

1. Narrative Description

The establishment of an Information Center, outlined in (A) above and the establishment of a network of worldwide linkages are closely connected. As could be seen in discussion of targets and accomplishments in (A), in the early stages of the project, establishment of linkages was an important means of acquiring new sources of input for the data base. The Project was asking for bibliographies and suggestions, while it was only able to promise future cooperation in return. The response was gratifyingly generous and widespread, with most respondents expressing great interest in the Project and a strong desire to share information, plans, ideas, and often publications.

Building and organizing the network was designated as one of the responsibilities of the Project Librarian, working in conjunction with the Project Director and the Information Resources Team. A number of contacts were made in the early months of the Project's first year, before the arrival of the Project Librarian. These contacts were principally with Land Grant universities and ARS experiment stations located in the Midwest to the Pacific regions of the United States. Other contacts were made with the Tropical Soils Consortium. The Project team members also had contacts through their professional colleagues.

During the study trip to France and West Africa that began in mid-June, significant advances in establishing linkages with IRAT and ORSTOM were made, and plans are underway to invite several of their scientists to visit for extended lengths of time (optimally at least one university quarter) at UCR, to engage in their own research projects, and at the same time to share their knowledge and experience with Project staff and graduate students in seminars, individual conferences, and as authors in the State of the Art review.

Linkage can take several forms. The most common for this Project, and by no means the least important, is mutual inclusion on mailing lists for publications, newsletters, reports, etc. For MUSAT this is a very widespread net of linkages which draws together individuals and organizations with what may be only marginal mutual interest, yet it does provide the means of communication for those areas of interest, however small they might be, which may prove important to either party. Because the world food situation is of vital importance to all peoples, and because the well-publicized drought in many areas of the semi-arid tropics drew the attention and sympathy of diverse groups and individuals, a wide variety of agencies fall into this first category.

Another level of linkage is that between organizations with strongly related and potentially overlapping interests where communication can avoid wasteful repetition of effort. In this regard, liaison with various organizations working primarily with the Sahel countries is perhaps the best example. Contact has been established with the FAO and UNESCO office working on Sahelian relief efforts, with the International Congress of Africanists Research Liaison Committee for Drought in Africa, and with Northwestern University, which is currently engaged in projects dealing with drought in Africa.

A third level of linkage is that of active research cooperation and interchange of personnel and ideas. Linkages of this sort have been initiated with IRAT (Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres), ORSTOM (Office de la Recherche Scientifique et Technique Outre-Mer) in Paris and their offices and counterparts in the Sahelian countries. Since the French research institutions, primarily IRAT and ORSTOM, have done the bulk of agricultural research in the Sahelian areas in the past, linkage with them and the governments of the Sahel countries with an eye to sharing in the knowledge that they have accumulated, and to cooperating in current endeavors, has been deemed a primary target of Objective/Output #2.

2. Targets for the Reporting Year

a. To identify and establish contact by mail, telephone and personal visit with individuals and organizations engaged in research, field work, or related activities in the fields of agriculture in the semi-arid tropics and African agricultural development.

- b To organize and maintain active correspondence files with these contacts, with exchange of information, publications and ideas.
- c To organize these files into a computerized directory.

The magnitude of accomplishment of these targets was necessarily vague because of the nature of the targets themselves. Identifying appropriate individuals and organizations in a worldwide context is not a cut-and-dried task, and active correspondence implies activity on the receiving side as well as on the part of the initiator. The last target (c) overlaps target (f) of Objective/Output #1. It can be quantified, but was set at a low target magnitude during the reporting year. This was partly due to pressure of higher priority tasks, and partly to the rigor that was applied in designing the directory information input.

Assumptions made in the drawing up of these targets were as follows:

- (1) It is assumed that AID/W will provide assistance in the initiation of linkages with the LDCs, in identifying training needs of institutions and individuals, and sites for cooperative activity in the LDCs, and in the exchange of information as part of the linkage network.
- (2) It is assumed U.S. and LDC institutions will cooperate with UCR in regard to the initiation and strengthening of linkages, exchanges and visits by staff and students, information exchange, and other cooperative activities.

The means of verifying progress made in this category might include on site visitation, viewing of the correspondence and card files, the Annual Report and other in-house and external reports, including those mentioned in

(a) above.

3 Accomplishments

a Accumulative

The current reporting year represents the first year of the Project.

b. Reporting Year

To widen linkages beyond the early contacts mentioned in the narrative description in order to cover, as much as possible, all organizations and individuals working in fields related to Project interests, a letter campaign was organized. Form letters describing the Project and asking for publication lists, bibliographies and suggestions were written in French and English and sent out widely. Patricia Paylore's somewhat out of date directory of arid lands research institutions ^{1/} was used as a base for the mailing list, augmented by addresses obtained from the Land Tenure Center Library at the University of Wisconsin-Madison. Addresses gleaned from articles and other correspondence were also used to compile the list. Responses to this mailing often led to other contacts. More recently, mailings have been undertaken to African Studies programs at universities in this country and abroad, and philanthropic, academic and other organizations worldwide with interests in West African development. For this mailing list, the African Studies Association directory of African Studies programs ^{2/} the SCOLMA directory of African Studies collections in British libraries ^{3/}, Duignan's similar volume for this country ^{4/}, the directory of educational institutions put out by the overseas Liaison Committee of the American Council on Education ^{5/} and other directories of voluntary organizations ^{6/} were used.

Five hundred twenty form letters and descriptive brochures were mailed out, and at present more than 173 files of active correspondence have

been established. A major portion of the 241 items received as gifts-- reported in (A) above--are publications and reprints received as response to this mailing campaign and its follow up. A major portion of the Project Librarian's duties is the maintenance of these files and the personal handling of correspondence and referring of information and questions to the appropriate Project staff.

Progress on the directory has been limited but steady. It was decided to use TRIM, the same program as that used for the bibliographic data base. The program has been tailored to the needs of the directory, and the citation card designed. The directory will be indexed by name, organization, location, subject field and geographic area of interest. Complete addresses will be printed, but will not be a searchable field of information. Like the bibliographic data base, the directory data base will be searchable on any of the indexed files or combination thereof. At present 645 entry cards have been partially prepared. This number includes names of individuals on organization charts for organizations even though active correspondence may have taken place with those individuals. It also includes organizations and individuals on the original mailing lists even though they may have made no response to queries. Attempts are now being made to fill in missing information on the entry cards, and also to construct a uniform thesaurus for subject fields. Although the computer program now in use does not provide enough character space per entry for detailed information, the directory data base will be keyed to manual files which can be accessed for more complete information. If cooperation is received from those individuals and organizations to be listed in the directory, these files will include a standardized information form listing their educational background, profes-

sional experience and current research interests.

c. Total Expenditures

Expenditures for the reporting year amounted to approximately \$2700 for postage, telephone and duplication costs and supplies.

Footnotes for Objective/Output #2

- 1/ Paylore, Patricia. Arid-Lands Research Institutes: a world directory. Tucson, 1967, University of Arizona Press.
- 2/ African Studies Association, Research Liaison Committee. Directory of African Studies in the United States 1974-1975. Waltham, Massachusetts, 1975, African Studies Association.
- 3/ Standing Conference on Library Materials on Africa. The SCOLMA Directory of Libraries and Special Collections on Africa. (Robert Collison, Compiler)
- 4/ Duignan, Peter. Handbook of American Resources for African Studies. Stanford, California, 1967, Hoover Institution on War, Revolution and Peace.
- 5/ Overseas Liaison Committee, American Council on Education. International Directory for Educational Liaison. Washington, 1973, OLC.
- 6/ Technical Assistance Information Clearinghouse of the American Council of Volunteer Agencies for Foreign Service. U.S. Non-Profit Organizations in Development Assistance Abroad. New York, 1971. (Also 1969 edition.)

C. Objective/Output #3 Improved Research Capability and
Increased Knowledge Base.

1. Narrative Description

In this first year, progress toward fulfilling this Objective/Output is closely tied to progress in Objective/Output #1. The State of the Art Review is the primary concern of the Project during this initial period. This involves a survey of research done to date, and the rapidly growing collection and bibliographic data base is vital to its success. The overall problem of agricultural improvement in the semi-arid tropics has been divided into specific areas, each of which will constitute the focus of study by Project team members. At present the foci comprise: the history of dryland farming systems; principles relating to dryland farming; climatology; soil characteristics (physical, chemical, morphological and microbiological); crop adaptation; soil-plant-atmosphere continuum of water; crop management; soil management; water harvesting; erosion control and wind breaks; pest management (including entomology, disease control and weed control)

From study of these problem areas will emerge specific topics of research which present themselves as areas of particular importance and/or areas where little research has been done to date. Emphasis will be placed on the investigation of techniques feasible for adaptation to Sahelian conditions.

2 Targets for the Reporting Year

- a To begin compiling the State of the Art Review.
- b To identify research problems

- c. To plan and initiate research projects related to those problems identified.

The magnitude of accomplishment expected is tempered by the realization that these are the beginning steps of what will be a major part of the Project's long term work. The State of the Art Review is not expected to be complete until the 24 month mark, and all of the targets for this reporting year are in the nature of beginning, preliminary steps.

Assumptions critical to the success of these targets were:

(1) that the Information Resources Team would be able to assemble in useable form the bulk of published and report material essential for the State of the Art review.

(2) that practical and feasible research problems whose solutions are likely to make a real impact on the overall problem would become evident in the course of making the State of the Art review.

The means of verifying progress made in this category would by and large have to be deferred until the appearance of the State of the Art Review. However, on site visitation, discussion with the appropriate staff members, and the Annual Report coupled with various in-house reports give evidence of progress.

3. Accomplishments

a. Accumulative

The reporting year is the first year of the Project.

b. Reporting Year

Research capability is difficult to quantify at this early stage in the Project. Agricultural research by members of the Project teams

in the past has been largely focused on problems of the temperate zone, centered naturally enough in southern California. Transfer of expertise from the temperate to the tropical zone must be done with some measure of caution, with the requisite study and training. However, one research project is being developed in relation to a graduate course in "Modeling Soil-Plant-Atmosphere Systems" that was devised as part of Objective/Output #5 (Educational Capabilities in Dryland Moisture Conservation and Utilization). This is being supported by grant funds through acquisition of a graphics display terminal, a hard copy unit (Tektronix 4010 and 4601) and a plotter (Hewlett Packard 9862A). Five students and their instructor, Dr. A. E. Hall, embarked on a team approach to develop a mathematical model of water-harvesting and cropping systems to fit in with dryland farming in the semi-arid tropics. The current model is only capable of crude predictions and to be useful new parameters to increase its accuracy must be derived from soil water use and crop yield data from the Sahel. A project for Dr. Hall to spend time in Bambey, Senegal with French researchers is planned during the next year.

Another aspect of Objective/Output #3 (linked with Objective/Output #5, below) comprises the dissertation research proposals of graduate students in the program. At present three graduate students, one each in the Departments of Plant Science, Earth Sciences and Soil Science and Agricultural Engineering are working on Project-related dissertation research. Two other students in the Department of Soil Science and Agricultural Engineering are scheduled to begin graduate studies in the Fall quarter, and several others have expressed strong interests.

D. Objective/Output #4 Increased Advisory Capacity

1 Narrative Description

Advisory functions were defined by the Educational Training and Advisory Team as including problem identification and analysis, program or project design, and project operation which may include education, training, research, technical services, and evaluation. The Educational Training and Advisory Team works closely with the Information Resources Team, and in this reporting period, most requests have been answered with bibliographic data, as described more fully in Section IV. It is expected that as the research competence in the area of semi-arid tropical zone agriculture grows, and as the UCR faculty becomes known as a talent pool for this region, agencies in the LDCs and elsewhere will call upon this Project for advisory purposes.

Another aspect of advisory capacity is the training of personnel on this campus. Much of this first year has been spent in orientation of the Project team members and other affiliated personnel on campus to conditions and problems of the Sahel region and of the semi-arid tropical areas in general. In the past year, several seminars and lectures have been held, films have been shown, and general reading suggested. These activities have been largely introductory in nature, outlining to the group attending them various aspects of either agriculture in the semi-arid tropics, or specific conditions and problems of areas of the Sahel. The study trip started in mid-June to West Africa was a major advance in the training of Project personnel in the problems of the Sahel zone.

Training of Project personnel also includes instruction in the French language. This was begun with a crash course for the travel team going to West Africa in June. Graduate students planning research overseas, and all

project staff are encouraged to work toward verbal and reading ability in French. Teaching materials in the form of the Living Language cassette tape and book system were purchased, and a collection of French African materials is being accumulated.

2. Targets for Reporting Year

- a. Orientation and training of Project personnel
- b. Fulfillment of requests as received
- c. Gradual publicizing of advisory capacity as those capabilities grow.

Magnitude of progress toward reaching these targets is necessarily somewhat low because of the nature of the targets and the age of the Project. It was intended to make appropriate beginning and preliminary steps in these directions, with the full flowering of these efforts to be seen at later stages of the Project.

An Assumption critical to the fulfillment of these targets is:

- (1) That LDCs will in fact seek out and accept advice from UCR.

Means of verifying progress made toward these targets could include evidence of the programs held and requests fulfilled, as indicated in in-house reports and records, as well as the Annual Report

3. Accomplishments

a. Accumulative

The reporting year is the first year of the Project.

b. For the Reporting Year

The lectures, films and other programs scheduled during the reporting year have been listed in Section VI. The Project has been

highly successful in the past few months in having international visitors from the Sahel countries visit the campus. Several of these visitors were selected from the Arrival List of International Visitors provided by the Bureau of Educational and Cultural Affairs, Department of State. This has proved to be a valuable means of training Project personnel as well as acquainting the community at large with the Project and the Sahel area and its people.

The members of the travel team and one of the graduate students in the program met with a teacher recommended by the French Department of UCR three times a week for six weeks prior to the team's departure for West Africa. Some noticeable progress in language ability was made. Teaching materials included the Living Language French course, extracts of French texts on agronomy and related topics, and pamphlets acquired from IRAT and other French research groups. Some technical vocabulary was thus included in the basic conversational course. Newspapers and other material has been collected for continued classes during the coming year.

Negotiations have been started to arrange for visiting professors, especially research faculty from IRAT and ORSTOM to come to UCR to work on their research and at the same time to share their knowledge and experience with students and faculty. These visitors would also form the basis of workshops planned for the near future. These workshops would deal with specific problems or techniques and would serve to draw together diverse individuals engaged in work related to Project interests.

Plans are being made to involve Project team members in the Soils Benchmark Project, headquartered at the University of Hawaii at Manoa. Our staff would work with the Benchmark Soils Project staff in sampling and

surveying soils in West Africa in order to ascertain where it is possible to concentrate immediate food production efforts.

Slide sets and other audio-visual materials are being compiled. Over 900 slides were taken during the recent trip to West Africa, and these are in the process of being duplicated, recorded and arranged to provide the bases of lectures and other presentations. These will form a valuable classroom aid. Film catalogs have been collected, and lists of films dealing with the Sahel region have been compiled from these catalogs. Several have already been shown on campus, and others will be arranged as time and circumstances permit.

c. Total Expenditures

In the reporting year \$1200 was spent on French instruction, and \$2500 was spent on honoraria, films and audio-visual equipment rental, slide reproduction, postage, and sundry costs.

E. Objective/Output #5 Educational Capabilities in Dryland

Moisture Conservation and Utilization.

1. Narrative Description

At an early meeting of the Curriculum Development Team, a core curriculum of courses already offered at UCR was itemized. These courses already deal with problems related to the Project, or could easily be modified to fit into Project-related areas. These courses are:

Soil Science 104	Soil Chemistry
Soil Science 107	Soil Physics
Soil Science 111	Soil Microbiology and Biochemistry
Soil Science 118	Soil Morphology
Soil Science 103	Soil Fertility
Soil Science 208	Soil Physical Condition and Plant Growth
Soil Science 206 (A&B)	Saline and Alkaline Soils

Plant Science 103
 Plant Science 104
 Plant Science 120

Ecology of Crop Plants
 Physiology of Crop Plants
 Grasses & Grasslands

Discussion has been underway for the possible addition of courses to the present curriculum, or the presentation of special topics in existing course structures in order to widen the educational element of the Project. Care is being taken in planning that such courses would be appropriate to UCR's overall program goals, and would fit in with University-wide curriculum planning. General topics for new courses which have been suggested are: Range and Soil Management; Watershed Management (water harvesting, etc.); Practical Methodology.

As has been pointed out earlier, a number of graduate students have already begun their doctoral studies in project-related topics, and several others are scheduled to do so within the coming year.

2. Targets for reporting year

- a. To encourage graduate students to take up project-related research, and to help initiate and guide such research.
- b. To expand the course offerings at UCR to include course work related to agriculture in the semi-arid tropics, and related topics.
- c. To obtain and evaluate curriculum information from other universities in the semi-arid dryland regions of the U.S. and in the LDCs.

The Magnitude of fulfillment of these targets is, like other of the Objective/Outputs, of a beginning and preliminary nature. Courses must be well planned before implementation, and it is this stage that was desired as the target for the reporting year.

An assumption critical to the success of the targets is that increasing numbers of students both from the U.S. and the LDCs will be interested in graduate programs at UCR and the educational offerings that relevant to dryland agriculture in low rainfall regions of the world.

Means of verifying progress made would include on site visitation, including sitting in on classes, and in-house reports as well as the Annual Report.

3. Accomplishments

a. Accumulative

The reporting year is the first year of the Project.

b. For the Reporting Year

One new course, entitled "Modeling Soil-Plant-Atmosphere Systems," has been devised and jointly offered as Plant Science 205 and Soil Science 205. In this course, students conduct analyses on the computer with mathematical models programmed by the instructors on the quantitative treatment of water-relations, temperature relations and gaseous exchanges in soil-plant-atmosphere systems. Students develop and program their own mathematical models that are related to crop production in the semi-arid tropics.

Of great importance in developing a curriculum for training students in dryland agriculture (with emphasis on the semi-arid tropics) is the design of field courses that will give the student maximum exposure to practical problems. Discussion by team members has centered on approaches and methods and some priority in development of the curriculum is being given

to this aspect.

c. Total expenditures

In the reporting year \$8,136.41 was spent on computer equipment, including purchase of a Plotter HP 9862-A and partial payment for the Textronix graphics display terminal.

IV. IMPACT OF GRANT SUPPORTED ACTIVITIES IN ACHIEVING GRANT PURPOSE

A. Accomplishments

1 Objective/Output #1: Central Information System

a) Development of a computerized bibliographic data base using Technique for Report Index Management (TRIM). This system allows complete access to the bibliography by outside users, and printout materials are now available. Cataloging is being done by usual library procedures and is being integrated directly into the UCR Library's collection. A Central Information System has been established and an institutional response is available. Although limited at this early stage in the 211(d) grant to bibliographic printouts, many valuable documents concerned with the African Sahel region are available to users. Details on how these will be distributed on request has not been established at this time.

The TRIM system may be a valuable tool to other 211(d) grant institutions for developing access to their specific projects. This would make possible a network of information exchange among the 211(d) universities, and possibly other users.

2. Objective/Output #2: Network of Worldwide Linkages

a) In setting up the mechanics for developing the Central Information System, the basic parts for developing a network of linkages was simultaneously being organized. Information linkages were established on a

very broad base with a promise that information exchange programs would be developed as the 211(d) project proceeded. This met with unqualified success and with the TRIM system and its many index options information has been gathered that will form the basis for a printout for a worldwide network of linkages. This may take several forms, such as a talent bank of researchers working on dry land farming problems, information sources, contact linkages where personal visits have been made, or combinations of these and other possible linkage areas. Preliminary programming is now underway and a printout will be available at the end of the coming year.

3. Objective/Output #3: Increased Knowledge Base

a) This Objective/Output is highly dependent on Objective/Output #1. The rapid progress in organizing the Central Information System has helped greatly in establishing a solid step for increasing the knowledge base. The first order of significance concerns developing the State of the Art (SOTA) Review. The printout with library assistance is made available to each SOTA campus reviewer. From this and his specialty concerned with dryland farming, library searches can be identified and material obtained that the researcher can use directly in the review. Securing a publisher of note--Springer-Verlag--to publish the SOTA as part of the Ecological Studies Series is in itself evidence that reasonable progress toward satisfying the grant purpose is being made. Also, a large number of staff is being involved in the SOTA project which demonstrates a broadening of the knowledge base.

b) The involvement of two U.S. graduate students and faculty to guide them in research projects related directly to the grant's purpose of increased knowledge of the research field is important. Their projects are concerned with crops found in the semi-arid tropics and concern production

and moisture utilization.

c) Planned team trip to African Sahel region which began on June 12. This is significant for several reasons: 1) Research staff gained an awareness of problems in the Sahel early in the grant period; 2) personal contact was established with French scientists; 3) we gained a knowledge of farming problems and some knowledge of solution of problems; and 4) we collected research information not usually available in regular journals.

4. Objective/Output #4: Increased Advisory Capacity

a) Although most emphasis in the time sequence of the grant was centered on the three previous Objective/Outputs, some significant accomplishments were developed that fit in with the purpose of the grant in developing an institutional response:

(1) Orientation and training of African travel team.

Materials were prepared related to the trip, films of the area were obtained showing farming and social customs, and an introductory French course was developed to acquaint the team with conversation and scientific knowledge base vocabulary. These methods and materials will form the basis for training other staff.

(2) Seminars. These were selected to serve campuswide but with a basic concern of training faculty in the departments concerned with the grant. The success of these seminars is shown by the large attendance which ranged from seventy-five to one hundred people.

(3) Negotiations by mail were started with IRAT and ORSTOM Headquarters, Paris, concerning staff and student exchange programs. The initial reaction to these suggestions has been positive and the groundwork has been laid for visits and the establishment of cooperative projects.

5.

Discuss, review and critically look at the present curriculum courses that relate to this Objective/Output. Perhaps the main problem is developing practical and methodology courses that fit the academic standards of the University. The importance of this development is a close look at the present curriculum at an early stage in the grant. This should allow time to effect solutions that can lead to a curriculum that will satisfy the Objective/Output.

b) The development of a new course entitled "Modeling Soil-Plant-Atmosphere Systems" and being jointly offered by the Departments of Soil Science and Agricultural Engineering and Plant Sciences is an important accomplishment early in the life of the grant. The interdisciplinary approach ties the two departments to a common course related to the grant--models on crop production in the semi-arid tropics-- and the opportunity to develop research projects in the Sahel using the models developed at UCR. Graduate students and faculty are now involved in projects that will be implemented during the coming year.

V. OTHER RESOURCES FOR GRANT-RELATED ACTIVITIES

No other resources were used for grant-related activities.

VI. UTILIZATION OF INSTITUTIONAL RESPONSE CAPABILITIES IN DEVELOPMENT PROGRAMS

A. Requests for Assistance

In this first year many of the requests were directed to the Information Resources Team. The Project is able to supply search services on the MUSAT data base, and copies of printouts of the results of those searches. Because of the schedule of updates, we are in a position to supply a limited --four-- number of full printouts of the bibliography upon request after the new update is complete. Arrangements for this have been made with the Institute of Agricultural Research, Addis Ababa. Plans to do the same with other institutions will be made as requests are received.

Often, requests for information are for copies of the items themselves, rather than a bibliography. It is expected that such services will in all likelihood be supplied to LDC institutions with which we establish firm cooperative linkages.

Requests for information and assistance come to the Project by several routes. In the early months, most requests were forwarded to this office rather circuitously from the office of the Drylands Research Institute, also on this campus. As correspondence with worldwide organizations has grown, requests for information have come more and more often directly to the Project. Occasionally we may receive requests forwarded to us from other universities in CID (Consortium for International Development). CID is conducting a Network Workshop at Arizona University in September to investigate the practicality of an information network that would involve the Consortium 211(d) projects. A function of this network would be to increase the efficiency of such cooperative handling of information requests. Our 211(d) program librarian and a member of the Library Systems Department will present papers at the workshop covering the Centralized Information System being developed

at UCR.

Another category of information requests comes from persons who are visiting on campus. In the months since the Information Resources team has developed, visits of this sort have occurred with increasing frequency, and it is expected that they will increase substantially in the near future. For such visitors, as well as for the Project team members themselves, the Information Resources team attempts to provide as full service as possible in orientation to the data base and in assistance in locating items listed therein.

Various requests for assistance in planning type programs in African LDCs were received during the latter part of the year. Some requests concerned the need for range management people, but since we do not have animal science or range management as part of the UCR curriculum, we could not meet these requests. Some requests centered in the semi-arid tropic regions and were concerned with problems that our staff could handle. Because we had plans for a team of UCR staff to spend several weeks in the Sahel and other countries, we declined action on requests for individuals to travel in Africa. Some of these were CID-AID initiated and therefore our action allowed other universities the opportunity to have staff visit and participate in the studies in the Sahel, providing a broader base for the Consortium for programs to be projected into that area in the future.

For an itemization of requests received see Table III (A and B) at the end of this report.

B. Specific Information

The University of California, Riverside has over the years attracted a large number of foreign graduate students because of its program in agricultural sciences and programs in liberal arts and the sciences. There are 166 foreign graduate students at UCR, counting all foreign countries. The Department of Soil Science and Agricultural Engineering, out of these students 11 are from LDCs. A statistical list by country follows:

Graduate Students from LDCs

<u>Country</u>	<u>Plant Sciences</u>	<u>Soil Science & Ag. Engineering</u>
Brazil	1	
Chile		1
Colombia		1
Ethiopia		3
Hong Kong	1	
India	1	
Iraq	1	
Jordan	1	
Libya	1	3
Mexico	1	
Nigeria	1	
Peru	1	
Philippines	1	
Saudi Arabia	1	1
Sudan	5	1
Venezuela	2	1

These students, along with the entire graduate student body, are invited to attend the seminars and lectures sponsored by the Project (listed in the following paragraph). The entire group often benefits greatly from the questions and discussion offered by graduate students from the LDCs at the Project seminars, and the free exchange of ideas and experiences offers education in its best and truest sense.

Seminar and Lecture Program

2 December 1974 - Mr. Volney M. Douglas, Range Ecologist, "An Ecologist's View of the Sahel."

5 December 1974 - D. Wynne Thorne, Vice President for Research and Director of Experiment Station, Utah State University, "Research Programs of International Crops Research Institute for Semi-Arid Tropics."

2 May 1975 - Bert A. Krantz, Agronomist, ICRISAT, Hyderabad, India, "Farming Systems Research for the Semi-Arid Tropics of the World."

27 May 1975 - Film: The Bend of the Niger.

28 May 1975 - Films: The Fulbe of M'Bantou; Maninka Villages; Trade and Markets in West Africa; and short anthropological films.

The Project has endeavored, over the past year, to build a training program for its own staff and students through visits, seminars and discussions by distinguished individuals whose experience could be of value to the Project and collections of materials. Prior to the study trip to West Africa, material on the area was collected and packeted for each team member. Special effort was made to present films with discussion that would orient the travel team to the ambience of West Africa. More recently, the Project has benefited from the regular receipt of the State Department's International Visitor List; two visitors with relevance to the 211(d) grant were invited, from Mali and Upper Volta. This visitor procedure will remain a regular part of the program. Attendance at these sessions has been consistently good; a relatively small amount of publicity yields a sizeable and responsive audience. Attempts are made to consistently inform the University and the community of the Project's nature, and to publicize appropriate events to a wider public.

Within the short lifetime of the Project, two research projects involving graduate students have been initiated, using an interdisciplinary team approach. The studies are crop-oriented and relate to the semi-arid tropics. The investigations concern the effects of water supply on yields of cowpeas and millet. These studies will involve measurements in a field situation as well as laboratory and growth chamber studies.

A graduate course titled, "Modeling Soil-Plant-Atmosphere Systems," was developed and classes started in the winter quarter. Grant funds were used to purchase a graphics display unit and a plotter for use in classroom instruction. This equipment by itself is not sufficient for the teaching program, but in cooperation with Dr. F. N. David, Chairman, and other members of the Statistics Department, software was developed and interactive time-sharing arrangements were made to use the equipment with the Statistics Department's NOVA 840 computer.

Of the foreign students, which constitute about 40% of the graduate enrollment of the Departments of Plant Sciences and Soil Science & Agricultural Engineering, the majority return to their home countries to assume key posts in universities and governmental research organizations; however, with the exception of isolated cases that have come to the attention of members of the faculty, we have not attempted to ascertain the individual significance of their positions relative to development programs in their countries.

We have had 25 Project visitors on campus. Many of these visitors were on study leave from foreign countries, others were with various foundations, newspapers and magazines, private companies and groups engaged in overseas activities.

Special note is made here of personal linkages established among universities with 211(d) grants, and with other groups, including the International Research Centers:

July 18-19, 1974	CID-211(d) and AID/W meeting in Denver attended by Dr. Cannell.
Sept. 12-13, 1974	CID-211(d) meeting in Tucson to discuss program planning and linkages, attended by Dr. Cannell.

- January 13-14, 1975 CID bi-annual meeting of Board of Trustees; also attended by Dr. Brams and Dr. Kirkwood of Prairie View A&M, representatives of the Tropical Soils Consortium, and representatives of AID/W, at UC Riverside. Attended by Dr. Cannell, Dr. Hall, Dr. Edmunds, Dr. Lewis, Dr. Pratt and Dr. Stolzy of UCR.
- February 4, 1975 CID-211(d)/CALI Meeting, Washington, D.C., attended by Dr. Edmunds.
- February 13-14, 1975 CID-211(d) meeting in Tucson, attended by Dr. Cannell.
- Feb. 18-22 1975 AID Workshop in Washington, D.C. to determine long term goals in soil and water management. Dr. Cannell attended and made contacts with Dr. Ralph Cummings, ICRISAT; Tom Wickham of the International Rice Research Institute; Dennis Greeland, International Institute for Tropical Agriculture; Rudy Dudal of FAO; and Herbert Pereira of the Ministry of Agriculture in London.
- March 16-19, 1975 Dr. Cannell presented seminars and engaged in discussion with students and staff on research and international programs at Prairie View A&M, thus establishing linkage with the Tropical Soils Consortium.
- April 16-19, 1975 Dr. Cannell visited with Dr. Bascom of the Berkeley Department of Anthropology and the Agriculture Library concerning background information for the team trip to Africa and as a contact for information exchange.
- April 30-May 1, 1975 CID-211(d) program planning meeting in Tucson attended by Dr. Cannell.
- May 12-15, 1975 Tropical Soils Consortium meeting in Hawaii which was also attended by representatives of CID, 211(d) grant universities and AID/W to study methodology of the State of the Art reports.

Other Linkages

- ICASALS (International Center for Arid and Semi-Arid Land Studies) at Texas Tech University. This organization presented a seminar titled "Frontiers in Semi-Arid Land Utilization," October 14-18, 1974 which was attended by Dr. Lewis Stolzy. ICASALS is part of CALI (Consortium of Arid Land Institutes).
- World Food Dilemma: Feast or Famine?, a seminar presented at UCR on March 27, 1975 which was attended by Dr. Cannell. The seminar was presented by University Extension and Cooperative Extension to explore the present food crisis. Contact was made with Claude Gifford of the U.S. Department of Agriculture, Ward P. Allen of the World Population Society, Assemblyman Charles Warren of the Committee on Energy and Diminishing Materials, Stephen J. Pringle, House Agriculture Committee and Congressman George E. Brown, Jr.

American Library Association. The Project Librarian attended the Association Conference in San Francisco June 30-July 2, 1975 to increase her contacts with librarians involved in similar bibliographic efforts, and those with African Studies programs.

ORSTOM - June 16, 1975 - contact with Dr. Fauck. ORSTOM Headquarters visited by African Team.

IRAT - June 16, 1975 - Dr. Claude Charreau. Visited by African team in Paris.

ICRISAT - May 2, 1975. Dr. Bert Krantz, Agronomist and Head of the Agricultural Systems Program visited on our campus and presented a seminar.

Rockefeller Foundation. Dr. U. J. Grant, Associate Director, visited on campus April 28, 1975 to discuss our 211(d) grant program. He offered the names of Bill Maschler and Mike Guscovski of the United Nations Development Projects as people who might be able to assist with arrangements in the Sahel.

Meals for Millions Foundation. Personal visit to campus by Executive Director Mark Sterner and Program Director Patricia Stevens to discuss information exchange. They have a program in Ecuador aimed, ultimately, toward the establishment of production of inexpensive, high protein food.

The progress in establishing and maintaining linkages has been discussed in full in Section III, Objective/Output #2. A partial list of the active correspondence file, and a list of the U.S. institutions with whom we have established firm information linkages is given in Appendix 1.

The Central Information System will become increasingly important to LDCs, the Consortium for International Development, the Tropical Soils Consortium and other U.S. universities involved in African studies, and to International Research Centers, FAO and many other organizations with special interests in the African Sahel region. A wide base of information on the Sahel is being collected since solving the food problems will necessitate the bringing together of many disciplines. Isolating this part of our 211(d) project exclusively to agriculture in the semi-arid tropics would limit the effectiveness of staff training and program planning during the remainder of the grant. By developing an exceptionally large information network linkage--which we are doing with organizations that

have information pertinent to the Sahel area--we can select materials and areas of information that will not greatly overlap. The Information Center will be responsible for dissemination of materials developed within the Project, such as research reports, State of the Art publications, talent bank of individuals and their research specialities, and computer bibliographic printouts as requested on subject matter. Copies of special publications within the collection will be made, possibly on a cost basis, but some will be provided free to LDCs on a selective basis. The information being accumulated will be part of the UCR library collection and it is anticipated that the Central Information System will continue to function with University support and/or with outside funding according to the needs of the Center.

As our staff develops its competence and increases its knowledge base in problems dealing with the semi-arid tropics, they will be prepared to assist LDCs in solution of problems. The State of the Art is expected to be completed at the end of the second year of the grant, and during the third year several projects with relevance to LDC problems will be underway.

These research leaders will then be available and have enough knowledge to advise in research projects and related activity. Planned cooperative projects with French scientists during the coming year should be very helpful in bridging and developing the knowledge base in both research and advising. We hope that through the Consortium for International Development activities and projects located in the semi-arid regions that several of our staff can gain experience working in that area. This will be supplemented by travel to these areas on special projects and by meetings and symposiums related to the grant.

Development of the curriculum to specialize in training of students in dryland farming in semi-arid regions of the tropics will continue and be completed during the last year of the grant. It is believed that the basic courses for a graduate program are now available, but may need modifications.

VII. WORK PLAN JUNE 1975 to JUNE 1977

1. Objective/Output #1: Central Information System

A. Information Storage and Retrieval. The strong effort put into this phase during the reporting year will be continued. More emphasis will be placed on working directly with the Project's Research Teams to develop needed bibliographic material related to the Project, but specific to the researcher's needs in developing the research projects. Special attention will be given in helping to develop a CID information network. A Network Workshop is scheduled in September that will bring the CID universities together as well as AID/W and other interested parties, hopefully to lay the foundation for this activity.

B. Acquisition of Library Materials. Considerable effort will be made to bring acquisitions in line with publications that have been identified and are now part of the computerized bibliographic data base. Of special need are on hand publications that deal directly with the State of the Art (SOTA). Categories for this publication have been identified and authors selected for each part of the publication. Many of the needed publications are not available for purchase and must be located through various services being offered in the Project's library. Copies of these are then made available to the SOTA project team.

2. The targets for the reporting year will continue to guide the basic part of the program for the coming year. The targets are as follows:

- a) scanning the materials already held in the UCR collection (serials and monographs) for relevant citations. Those relating directly to the project have been scanned. Journals more specifically related to the researchers' needs for material to support a research project or as part of the SOTA project will be scanned as required.

- b) identifying through bibliographies, catalogs, publication lists and other data bases, material for inclusion.
- c) tailoring the TRIM program for MUSAT use, including further modification of a subject thesaurus.
- d) undertaking acquisition of material (see B above).
- e) continued efforts to establish a wide range of linkages with individuals and organizations with similar interests.
- f) organizing information from correspondence files into a computerized directory of persons and organizations having expertise in agriculture in the semi-arid tropics and/or African agricultural development.
- g) providing reference assistance and other research aids to Project members, graduate students, and other persons using the data base and collection.
- h) providing reference assistance in response to requests from outside the University, especially those from LDCs.

Some of the target areas will be refined and others expanded. The needs, as pointed out in categories A and B, will be a guide to this part of the program.

2. Objective/Output #2: Network of Worldwide Linkages

A. The establishment of a network of linkages is directly related to Objective/Output #1 above and is being developed at a rate consistent with that of the entire information system. The same computerized system is being used to develop this phase and will be searchable through the index system by name, organization, location, subject field and geographic area, or any combination of the index. This information will be made available to users in the latter part of the year.

B. A second set of linkages, which are part of the informational linkage system but are separated because program ties have been initiated, will be continued, i.e. The Benchmark Soils Research Project of the University of Hawaii Tropical Soils Consortium. It is hoped that a member of the UCR Project will be a part of the African Benchmark site program in survey and sampling.

C. Personal contacts with ORSTOM and IRAT were made by the travel team at the headquarters in Paris and on the local level in the African Sahel countries. These linkages will be continued as cooperative projects develop. Dr. Bert Krantz, ICRISAT, visited the campus and presented a seminar on "Farming Systems in the Semi-Arid Tropics." This will be followed by a visit to ICRISAT during the coming year. Visits were made with individuals at the Office of Arid Lands, Tucson; contact was made with ICASALS at Lubbock, Texas and with the Dryland Research Institute at Riverside. These contacts will be maintained through continuing visits. Strong linkages will be maintained with the CID Universities through projects, meetings, and through 211(d) grant activities. Personal contacts were made with all universities comprising the Tropical Soils Consortium. A visit to Prairie View A&M was made to establish a linkage in 211(d) grant program activities, and this will be pursued during the coming year to arrive at some cooperative activity.

3. Objective/Output #3: Improved Research Capability and Increased Knowledge

A. The emphasis on this output during the year is to complete the SOTA publication which will increase the knowledge base of many faculty members. The broad part of the SOTA study will be published as part of the Ecological Studies Series by Springer-Verlag. Special emphasis will be placed on the semi-arid tropic regions. Cooperative arrangements are underway to bring

French scientists of ORSTOM and IRAT to the UCR campus to participate in seminars and in developing the SOTA. It is recognized that their contribution to this part of our program is extremely valuable and will be helpful to our staff in getting the feel of the semi-arid tropic regions

B. Cooperative research projects are also being planned with the French and the Sahel countries. Plans are being developed to have a staff member spend several months at Bambey, Senegal working with the French on application of simulation modeling systems. Plans are in the making to apply modeling systems developed at UCR to various areas in the Sahel where climatic and crop data are available. These studies might include the following:

1) Given crop yield responses to different levels of water supply in one location, the model will predict: yields by the same variety over a wide range of climates; yields by the same variety over a wide range of soil conditions; and yields with different water-harvesting or fallow systems.

2) The model can be used to identify key limiting processes or conditions in dryland farming, e.g. Is water-harvesting adequately effective with soils of low moisture retention capacity or of relatively shallow depth?

3) The model can be used to guide the design of field experiments for areas in the Sahel zone where little field experience has been obtained with a particular farming system, e.g. the model can predict optimum water harvesting/cropping area ratios and optimum season length to facilitate the choice of varieties.

A program stressing the interdiscipline team approach is planned for a geographer from UCR to spend a year in one of the Sahel countries. He will obtain detailed information on farm methods, farm labor movements during the course of the dry and wet season, and as much basic information as possible on crops, cropping systems and yields. Tied into this will be the reasons behind the farming methods, including traditions, customs, etc. An isohyetal tranche will be made from East to West across the selected country in a rainfall range of 300 to 700 mm.

4. Objective/Output #4: Increased Advisory Capacity

A. A team trip into the Sahel was begun on June 12, 1975 and will be completed in early August. Five University staff members were selected to cover a broad area of research, including (1) legumes and range management; (2) crop breeding and agronomy; (3) soil pedology and classification; (4) soil physical properties and water relations; and (5) soil-water-plant relations and soil physical properties.

The main objectives of this team trip are: (1) to obtain an awareness of problems in the Sahel; (2) to develop a knowledge base of research information through visitation with scientists, collection of materials and visits to research areas and other sites normal to the Sahel; (3) to develop cooperative programs with the French in staff exchange and student exchange. The team will develop a full scale report from this trip which will be used as a guide to future research and advisory programs on campus and in the Sahel. Film slide sets will be developed to use with our staff to increase their knowledge of the semi-arid tropic region. French research staff will be invited to spend time at UCR. They will conduct seminars, workshops, and work on research projects that will benefit their programs and be an asset to the Project's research program.

B. Other seminar programs are planned that will increase the knowledge base of the staff scientists. These include subject areas in legumes, water harvesting, and areas covering soil water-plant atmosphere studies.

C. Visits by two staff members to the Sahel region are planned in connection with SOTA. These would cover specialized areas in nematology and entomology.

D. Oregon State University (OSU) is now a full fledged member of CID, and has received a 211(d) grant to work on dryland problems in a Mediterranean type climate. Plans will be developed with OSU to present a symposium relating to the dryland programs of UCR and OSU.

5. Objective/Output #5: Educational Capabilities in Dryland Moisture Conservation and Utilization

A. Team meetings will continue with the program that was initiated during the past year. The Executive Committee voted to establish a working committee between Soil Science & Agricultural Engineering and Plant Sciences to address itself to courses related to development of practical field type agricultural courses that could be developed for training LDC students. It is planned that a staff member will visit LDC universities in the semi-arid tropic regions of Africa to seek their input in developing these courses.

VIII. INVOLVEMENT OF MINORITY PERSONNEL AND WOMEN

All positions of employment in the Project are recruited through regular University of California, Riverside procedures and channels, following UCR's guidelines for Affirmative Action and Equal Employment Opportunity. The Project Team members comprise faculty of the Plant Sciences and the Soil Science and Agricultural Engineering Departments, and reflect the racial and sex balance already maintained in those departments. New hiring was necessary for the position of Project Secretary, and the staff of the Information Resources Team.

The Project Secretary was hired through the usual recruitment channels of the UCR Personnel Office, the position being advertised for the recommended period of time, and a number of applicants were interviewed. The position required some reading knowledge of French, in addition to good secretarial skills, and this was a factor in hiring the successful candidate.

The Project Librarian was hired as a result of a nationwide recruitment, with advertising in the professional librarians' media. Special education and experience required included proficiency in French, experience in African studies, and background in either the agricultural or social sciences. The successful candidate exhibited all of these qualities.

The Library Assistant III was also recruited through the UCR Personnel Office, with special background requirements including knowledge of bibliographic applications of computer data bases and basic library skills and routines. After a number of interviews, a successful candidate was found who exhibited these qualities.

Particular effort was made to implement Affirmative Action in hiring student and general assistants. These positions were advertised through Library Personnel, and a number of candidates were interviewed. For most of these positions minimal special background was required, except in those positions requiring reading knowledge or translation ability in French. A good reading knowledge of English was necessary, and this requirement was somewhat relaxed in two cases to hire graduate students from LDCs with good background in the agricultural sciences but with some problems in English comprehension and expression. When feasible, the student assistant positions of the Information Resources team have been used to provide interim financial support to graduate students scheduled to take up Project research assistantships. A recruitment program for graduate students was undertaken at several of the universities included in the 211(d) grant networks and consortia, most strongly at Prairie View A&M, where the student body is predominantly Black American. Consistent attempts were also made to include graduate students already on this campus from the LDCs.

The following minority personnel and women have been hired to work on the Project:

Project Office Staff:	1	(Woman)
Information Resources Staff (permanent)	2	(Women)
Student Assistants	6	(Women)
Foreign Students (from LDCs)	2	(1 Mexican; 1 from Philippines)

IX. OTHER

In a project of this nature there is always a rather large University contribution in program space and in faculty and staff time that is involved in cooperative activities that involve planning, evaluation, and directing program activities. The University was particularly helpful to the grant program by providing space at the beginning of the program to house the Central Information System, and office space for the program's librarian and secretary. Excellent cooperation has been extended by all units connected with the project, but in particular the University Library staff. It is not the intention to delineate complete University support, but rather to point out the significance of this aspect in the 211(d) project. Some estimate of faculty and staff time provided by the University may be made using the Objective/Output method as a basis.

1. Objective/Output #1: Central Information System	Man Hours
a. Information Resources Team - composed of five UCR and four faculty - 10 meetings and individual consultations	250
b. Executive Committee	10
c. Soil Science & Agricultural Engineering office services (budget, etc.)	40

	<u>Man Hours</u>
2. Objective/Output #2: Network of Worldwide Linkages	
a. Part of Information Resources Team activity	50
b. Executive Committee	4
c. Soil Science & Agricultural Engineering office services (budget, etc.)	40
3. Objective/Output #3: Improved Research Capability and Increased Knowledge Base	
a. Research Team - consists of four faculty - Various meetings, graduate student committees and individual attention to graduate students	1,000
b. Executive Committee	
c. Soil Science & Agricultural Engineering office services (budget, etc.)	40
4. Objective/Output #4: Increased Advisory Capacity	
a. Educational Training and Advisory Team - consists of three members - Two meetings and individual consultation	20
b. Executive Committee	6
c. Soil Science & Agricultural Engineering office services (budget, etc.)	40
5. Objective/Output #5: Educational Capabilities in Dryland Moisture Conservation and Utilization	
a. Curriculum Development Team - consists of 5 members - Four meetings, travel to other universities, consultation, teaching	100
b. Executive Committee	10
c. Soil Science & Agricultural Engineering office services (budget, etc.)	40

Total Man Hours 1,650

Table I

Distribution of 211(d) Grant Funds and Contributions From Other Sources of Funding
 Reporting Period June 20, 1974 to June 19, 1975

211(d) Expenditures					
Grant Objectives/Outputs	Period Under Review	Cumulative Total	Projected Next Year	Projected to End of Grant	Non-211(d) Funding Amount
Central Information System	42,174	42,174	72,877	186,344	No non-211(d) funds used
Network of Worldwide Linkages	10,903	10,903	23,239	81,547	
Improved Research Capability & Increased Knowledge Base	22,007	22,007	118,684	489,208	
Increased Advisory Capacity	13,018	13,018	44,161	183,482	
Educational Capabilities in Dryland Moisture Conservation and Utilization	3,234	3,234	7,014	59,419	
	<u>91,336</u>	<u>91,336</u>	<u>265,975</u>	<u>1,000,000</u>	

Table II-A

211(d) Expenditure Report
Actual and Projected Summary
Under Institutional Grant #AID/csd 1141
Reporting Period 6-20-74 to 6-19-75

	Expenditures to Date		PROJECTED EXPENDITURES				TOTAL
	Report- ing Period	Cumu- lative Total	'75-'76 Year 2	'76-'77 Year 3	'77-'78 Year 4	'78-'79 Year 5	
1. Salaries & wages	44,126	44,126	106,616	123,900	108,000	100,000	482,642
2. Student stipends	3,204	3,204	23,982	36,980	31,000	24,000	119,166
3. Library	10,913	10,913	29,000	8,000	4,000	4,000	55,913
4. Research (not applicable as a separate item)							
5. Travel - Domestic	3,763	3,763	4,800	3,000	5,000	4,000	20,563
Foreign	-0-	-0-	31,209	11,000	6,000	6,000	54,209
6. Equipment & Supplies	8,136	8,136	22,400	4,000			34,536
7. Publications	-0-	-0-	5,000	5,000	1,000	5,000	16,000
8. Other*	21,194	21,194	42,968	50,809	45,000	57,000	216,971
	<u>91,336</u>	<u>91,336</u>	<u>265,975</u>	<u>242,689</u>	<u>200,000</u>	<u>200,000</u>	<u>1,000,000</u>

* Includes fringe benefits (average of 12%), honoraria for guest lecturers, telephone, Xerox and duplication, storehouse supplies, miscellaneous supplies and services, consortia fees, equipment under \$2500, advisory and training to LDC requests, training workshops, and curriculum development.

Table II-B

211(d) Expenditure Report - Reporting Year Detail

Under Institutional Grant #AID/csd 1141

6-20-74 to 6-19-75

I. A. Salaries - Academic	
G. Cannell (100%)	22,600
B. Other	
Library: V. Jorgenson (50%)	2,933
G. Dihoff (100%)	4,800
Clerical: S. Roderick (100%) 6 mos., Sec. II	3,909
P. Copeland (100%) 3 mos.-Library Asst. III	2,720
P. Copeland (50%) 5 mos.-Key Punch Operator	1,052
Student help - LT (50%)	6,111
C. Fringe benefits for the above	5,930
II. Student Support:	
Peter Shouse, USA, \$1,375 plus \$227 fees	1,602
Kenneth Turk, USA, \$1,375 plus \$227 fees	1,602
III. A. Consultants - None	-0-
B. Guest lecturers, visitors, etc. (3)	598
IV. Travel	
A. Domestic (14 trips)	3,763
B. Foreign - None	-0-
V. Equipment (\$2500 or over)	
Plotter HP 9862-A	3,591
Computer	4,546
VI. Library Acquisitions	10,912
VII. Publications	-0-
VIII. Other (telephone, postage, duplications, etc.)	14,667
	<u>\$91,336</u>

Table III-A

Requests for Assistance Received During Reporting Period June 20 , 1974 to June 19, 1975

A. Requests Attended

Description of Request for Assistance	Whom did you Assist?	Who Requested Assistance?	Who Funded Assistance	Size of Effort		Results of Assistance
				Dollars	Man Days	
Bibliographical lists	Institute of Agricultural Research, Addis Ababa, Ethiopia	J.H. Saunders FAO Agronomist	PROJECT	minimal (see narrative)	0.1	The Institute receives a copy of our data base printout, approximately one month outdated.
Bibliography of soil moisture and water harvesting	Dryland Agricultural Research Project, Rajasthan, India	M.T. Dreshmukh Ag. Engineer	PROJECT		0.1	Printout of relevant entries as of March 1975.
Bibliography of the Sahel region	Northwestern University: Library and African Studies Program	Daniel Britt Ronald Cohen	PROJECT		0.1	Printout of relevant entries, to be updated monthly.
Information on tree culture in West Africa, especially Carob.	H. Esbenshade	Same			0.1	Mr. Esbenshade consulted the collection at length.
Information on agricultural practices in Niger.	Arthur Jokelas	Same			0.2	Mr. Jokelas consulted the collection at length.
Oil seeds man with language capability for Bolivian contract.	Utah State	B. Anderson			0.1	Sent list of 5 UCR people. No further contact received.
Information on training center for Iranians and Venezuelans for 2-3 months general farm management experience.	CID	B. Anderson			0.4	Sent information indicating possibility of training center at UCR.

continued

Table III-A (continued)

Description of Request for Assistance	Whom did you Assist?	Who requested Assistance?	Who funded Assistance	Size of Effort		Results of Assistance
				Dollars	Man Days	
					0.5	Sent information on cost to operate 200-300 acre farm in Riverside County area.
Rural sociologist to join 6 man team visit to Kenya	CID	B. Anderson			0.1	Sent names of Professors Charles Starnes and Craig Brown of UCR. No further contact received.
Range Management Specialist for 2 year trip to Upper Volta	CID	B. Anderson				Referred to Davis Campus
10 Iranian farm managers to visit area to observe agricultural operations. Can we arrange contacts.	Utah State CID	Bruce Muir			0.5	Referred to Marvin Miller, UCR Foreign Visitor Programme Program planned and contacts for visits made to large farms and central and southern California. Funds for this program were canceled by Iran shortly before the scheduled visit.

Table III-B

Requests for Assistance Received During Reporting Period June 20 , 1974 to June 19, 1975

B.- Requests not Fulfilled

Description of Request for Assistance	Whom did you Assist?	Who Requested Assistance?	Who Funded Assistance	Size of Effort		Why Not Met?
				Dollars	Man Days	
Bibliography on agricultural problems of the rainfed areas of Pakistan and India.	PASTIC Dr. A. R. Mohajir	same				Too few entries at that time on India and Pakistan. Search will be run on new material, although result will still be low.
Bibliography of Geo-ecological and Agricultural problems of Iran	Geographisches Dr. Otfried R. Weise	Institute der Un. Wurzburg				No entries at that time on Iran. Scanning still shows minimal entries. Inquiry sent for other area concerns
Bibliography and information on atomic power use in well drilling in the Sahara	Naval O Lab.	Dr. A. Magnus				Information outside our scope. Request was referred to Linda White at University of Arizona
Short term help in irrigation design	CID	B. Anderson				No engineers with needed experience on campus.
Team member for 2 week trip to Kenya.	AID/W	Tej Gill				We were interested but already had a visit planned to Africa involving 5 team members from UCR.

INSTITUTIONAL LINKAGES - May 1975

* Indicates personal contact through visitation.

Division of Soils, CSIRO
P.M.B. 1, Glen Osmond
Adelaide, South Australia

New South Wales Soil Conservation Service
Box 4293
GPO Sydney
New South Wales, Australia

Horticultural Research Section, CSIRO
Merbein
Victoria 3505, Australia

International Development Research Centre
P. O. Box 8500
Ottawa, Ontario
Canada K1G 3H9

Institute for International Cooperation
University of Ottawa
Ottawa, Ontario
K1N 6N5 Canada

Centre for Developing Area Studies
3437 Peel Street
McGill University
Montreal 112, Quebec, Canada

Centre de Recherches Tchadiennes
Fort Lamy
Chad

Direction du Plan et du Developpement
Ministere du Plan et de la Cooperation
B.P. 286
Fort Lamy, Chad

Mr. D. Many
Chef du Service meteorologique de la
Republique du Tchad
B.P. 429
Fort Lamy, Chad

ORSTOM
B.P. 65
Fort Lamy, Chad

Service de la Statistique generale
et des Etudes Economiques
Commissariat general au Plan
B.P. 453
Fort Lamy, Chad

International Working Group for Indigenous
Affairs
Frederiksholms Kanal 4A
BK 1220 Copenhagen K, Denmark

Institute of West African Studies
University of Birmingham
Birmingham, England

University of Durham
Department of Geography
Science Laboratories
South Road
Durham City, England

Peggie Benton
Vine House
Appledore
Ashford, Kent, TN26 2BU, England

Commonwealth Agricultural Bureau
Farnham House, Farnham Royal
Slough Bucks, SL2 3BN, England

Land Resources Division
Overseas Development Administration
Tolworth Tower
Surbiton, Surrey, England

Disaster Research Unit
University of Bradford
Bradford, Yorkshire BD7 1DP, England
Director, Mr. J. Lewis

SOAS
University of London
London, England
(David Dalby)

Institute of British Geographers
Developing Areas Study Group
Dr. Alan Gilbert
University College London
Department of Geography
Gower Street
London WC1N 6BT, England

International African Institute
St. Dunstan Chambers
10/11 Fetter Lane, Fleet St.
London EC4, England

Technical Commission for Cooperation in
Africa South of the Sahara
Joint Secretariat
Watergate House, York Buildings
London WC2, England

Office de la Recherche Scientifique et
Technique Outre Mer
Service Central de Documentation
70 a 74 Route d'Aulnay
93 Bondy, FRANCE

Centre d'Etudes Phytosociologiques et
Ecologiques (CEPE)
Route de Mende
B.P. 1018
Montpellier (Herault) France

Catherine Coquery-Vidrovitch
A111
8 Rue Cdt Rene Bouchette
Paris 14, France

Groupement d'etudes et de recherches
pour le developpement de l'agronomie tropicale
5 square Petrarque
Paris 16^e, France

Groupement d'Etudes et de Recherches pour le
Developpement de l'Agronomie Tropicale
42 rue Scheffer
75016 Paris, France

* Institute de Recherches Agronomiques
Tropicales
110 rue de l'Universite
75340 Paris, France

Institut d'Etude du Developpement
Economique et Social (IEDES)
58 boulevard Arago
Paris, France

Claude Meillassoux
2 rue de Mirbel
Paris 5e, France

* Office de la Recherche Scientifique et
Technique Outre-Mer (ORSTOM)
24 rue Bayard
Paris 8e, France

Yves Person
10 rue Cornot
Mary-le-Roi 78, France

* International Crops Research Institute
for the Semi-Arid Tropics
1-11-256 Begumpet
Hyderabad 16, A.P., India

Negev Institute for Arid Zone Research
P. O. Box 1025
Beersheba, Israel

A. Blum, Research Agronomist
Division of Field Crops
Agricultural Research Organization
Volcani Center
Bet Dagan, Israel

Volcani Institute of Agricultural Research
Soil Physics and Technical Division
P. O. Box 15
Rehovath, Israel

Weizmann Institute of Science
Plant Genetics Section
Rehovath, Israel
(Dr. Dan Atsmon, Sr. Scientist)

Mr. Neal R. Carpenter
 Chief, Farm Management Division
 Agricultural Services Division
 FAO
 Via delle Terme de Caracalla
 00100 Rome, Italy

East African Agriculture and
 Forestry Research Organization
 P. O. Box 30148
 Nairobi, Kenya

United Nations Environment Programme
 Division of Ecosystems & Natural Resources
 P. O. Box 30552
 Nairobi, Kenya

Arid Lands Agricultural Development
 Program
 P. O. Box 2379
 Beirut, Lebanon
 (Dr. Robert Havene, Director
 Ford Foundation)

Direction Nationale de l'Agriculture
 Bamako, Mali

Direction Nationale des Eaux et Forets
 Bamako, Mali

IRAT/MALI
 B.P. 438
 Bamako-Sotuba, Mali
 (Mr. Poulain)

Mr. M. Sissako
 Chef du Service Meteorologique du Mali
 B.P. 237
 Bamako, Mali

Institut Polytechnique Rural
 Katibougou, Mali

Institut de Recherche Scientifique
 Koulouba, Mali

M. Le Directeur General de l'Agriculture
 Cheikh Benani Youba
 Nouakchott, Mauritania

Charge de la Recherche Agronomique
 M. Amadou Bachirou Barc
 B.P. 180
 Nouakchott, Mauritania

Institut du Desert
 Nouakchott, Mauritania

Mr. Arona Sall
 Chef du Service de Meteorologie
 B.P. 205
 Nouakchott, Mauritania

International Maize and Wheat Improvement
 Center (CIMMYT)
 Londres 40
 Mexico 6, D.F. Mexico

M. Abdou Boukay
 Representant permanent du Niger aupres de l'OMM
 Service Meteorologique
 B.P. 218
 Niamey, Niger

Direction du Plan
 Commissariat General du Developpement
 Niamey, Niger

IRAT/NIGER
 Mr. Nabos
 B.P. 150
 Niamey, Niger

G. E. Cook
 EDAR, Moor Plantation
 PMB 5042
 Ibadan, Nigeria

* International Institute of Tropical Agr
 Oyo Road, PMB 5320
 Ibadan, Nigeria

B. R. Taylor
 F T O JP 26
 P.O. Box 1062
 Kano Agricultural Research Station,
 Kano, Nigeria

Mr. Goodrich
Samaru Institute for Agricultural Research
Ahmadu Bello University
PMB 1044
Zaria, Nigeria

Mr. James Clifton
AID/USDA
Major Cereals Research Project Team
Samaru
Zaria, Nigeria

* Karl R. Stockinger
Samaru Institute for Agricultural Research
Ahmadu Bello University
PMB 1044
Zaria, Nigeria

Lew E. Wallace
Research Entomologist
West Africa Major Cereals PASA
Samaru
Zaria, Nigeria

N. Zummo
Samaru Agricultural Research Institute
Ahmadu Bello University
PMB 1044
Zaria, Nigeria

L. Sauger
Directeur
Institut Senegalais de la Recherche Agronomique
Bambey, Senegal

Francois Leger
L'Ingenieur de Liaison pour l'Afrique de l'Ouest
OAU/STRC JP 26 (Cereal Research)
B.P. 3340
Dakar, Senegal

Dr. Mansour Seck, Chief
Division de la meteorologie
Batiment administratif
B.P. 4014
Dakar, Senegal

Djibril Sene
Delegation Generale de la Recherche
Scientifique et Technique
Dakar, Senegal

Institut Fondamental d'Afrique Noire (IFAN)
PO Box 206
Dakar, Senegal

Centre de Recherches Pedologiques
de Hann-Dakar
Hann-Dakar, Senegal

ORSTOM
B. P. 1386
Dakar-Hann, Senegal

Secretariat for International Ecology
Sveawagen 166¹⁵ S-11346
Stockholm, Sweden

USA

* Ms. Patricia Paylore
Assistant Director
Office of Arid Lands Studies
University of Arizona
Tucson, Arizona 85719

* Karen Fung
Assistant Curator
Africa Collection
Hoover Institute on War, Revolution & Peace
Stanford, California 94305

Dr. Shirley K. Fischer
Director
Overseas Liaison Committee
American Council on Education
1 Dupont Circle
Washington, D.C. 20036

National Academy of Sciences
National Research Council
(Board on Science & Technology for
International Development)
2101 Constitution Avenue
Washington, D.C. 20418

Christide Zolberg
University of Chicago
Chicago, Illinois 60637

Daniel Britz
Bibliographer of Africana
Melville J. Herskovits Library of
African Studies
Northwestern University
Evanston, Illinois 60201

International Programs in Agriculture
Purdue University
Lafayette, Indiana 47901

Donald Vermeer
Department of Geography & Anthropology
Louisiana State University
Baton Rouge, Louisiana 70803

James Armstrong
African Studies Library
Boston University
Boston, Massachusetts

Research Liaison Committee
African Studies Association
Schiffman Center
Brandeis University
Waltham, Massachusetts 02154

Charles Frantz
State University of New York
at Buffalo
Buffalo, New York

International Development and Social Change
Clark University
Worcester, Massachusetts 01610
William Renwick

* The Ford Foundation
320 East 43rd Street
New York, New York 10017

* The Rockefeller Foundation
111 West 50th Street
New York, New York 10020

Elizabeth A. Widenmann
African Bibliographer
Herbert Lehman Library
Columbia University
New York, New York 10027

Sahelian Liaison Office
Room 3862 G
United Nations
New York, New York 10017

* ICASALS
P. O. Box 4620
Texas Tech University
Lubbock, Texas 79409
Frank B. Conselman, Director

Centre Voltaique de la Recherche
Scientifique
B.P. 6
Ouagadougou, Upper Volta

Comite Permanent Interetats de Lutte
contre la Secheresse dans le Sahel
P. O. Box 7049
Ouagadougou, Upper Volta

IRAT/UPPER VOLTA
B.P. 596
Ouagadougou, Upper Volta
Mr. Poulain

Mr. Ambroise Kabre
Representant permanent de la Haute Volta
aupres de l'OMM
B.P. 576
Ouagadougou, Upper Volta

Abdoulaye Y. Toguyeni
Rector
Universite d'Ouagadougou
Ouagadougou, Upper Volta