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# REPORT OF PRAIRIE VIEW A&M COLLEGE

## FOR THE PERIOD

## JULY 1, 1972 TO JUNE 30, 1973

A. TITLE: A Grant to Strengthen the Capabilities of Prairie View A&M College in Relation to Soil Fertility Problems Under Savanna-Prairie Ecology (Grant AID/CSD 2836)

B. GRANTEE: Prairie View A&M College

C. DIRECTOR: Dr. James I. Kirkwood

D. STATISTICAL SUMMARY

1. Period of Grant: June 30, 1970 to June 30, 1975

2. Amount of Grant: $ 500,000

3. Expenditures

3.1 For report period: $ 130,315.72

3.2 Accumulated: $ 224,647.76

3.3 Anticipated for next year: $ 136,000

E. NARRATIVE SUMMARY

1. Since the inception of the grant to Prairie View A&M College, the first phase, described in the Annual Reports of 1971 and 1971-72 has been perpetuated and enlarged towards achieving the ultimate objective of the grant of increasing the competency of faculty and students in the acquisition and utilization of substantive knowledge of tropical soils, especially within the savanna-prairie ecosystem, for the purposes of human development.

The Master of Science program has been enlarged to include 5 new courses and 10 students, of which 5 came from foreign institutions. This year, 3 students have completed the requirements for the M.S. degree in Soils and have graduated.

The expansion of the Resource Center is continuing with special emphasis on the collection of materials relevant to savanna ecosystems.

Since the last report, the number of faculty who have incorporated an open system of instruction (competency-based-systems) have increased. Supplemental to this system, additional classroom space, audio-visual equipment, and programmed teaching aids have been acquired.

Having structured a foundation staff, facilities, graduate program, resource materials, and updated teaching systems, this year phase 2 (the phase delineation is an arbitary one) begins to evolve and stresses the services of consortium personnel, consultant-lectures, and visiting professors from diverse geographical regions and disciplines to supplement and increase our knowledge of tropical soils. In addition, the graduate research program and teaching thrust has been expanded to include agricultural problems relevant to the countries from which the students originate as well as those regions predominately in the savanna zones. On-site visits to savanna sites and institutions concerned with agricultural development have been conducted and more are being planned.

A computer-based program for information storage and retrieval has been developed at Prairie View which will permit greater flexibility in the analysis of stored information than conventional library files systems. This is particularly relevant for the compilation of data from savanna ecosystems.

The work in phase 3 (not yet initiated) will be aimed to build on the structures encompassed in phases 1 and 2, but the future efforts will utilize the accumulated knowledge and expertise to (1) delineate the most

relevant research commitments and (2) evaluate the most promising systems that would alleviate the pressing constraints to agricultural production, preserve the tropical ecosystems, and improve the livelihood for the farmer of limited resources in developing countries, a segment of the rural population that is of particular concern to Prairie View A&M College.

2. Information Retrieval and Storage

This year, information concerning savanna ecosystems came from consultants who have had extensive experience in both Anglophone and Frankaphone countries. Also acquired were special publications, documents, and abstracts from diverse sources dealing with this ecosystem. Our staff attended conferences, workshops, symposiums and seminars concerning different phases of agricultural development. These presentations were taped for the Soils Resource Center and the Data Bank and handout materials cataloged and filed for future storage in the APL computer file system. This system, a programmed language plus file sub-system was installed which adds two fundamental capabilities to information acquisition. They are (1) the entry, retention, and access, under programmed control, of more data than could be stored by conventional library files and (2) the sharing and selective modification of the data base by any group of users.

3. Institutional Linkage

Linkage with indigenous institutions in several developing countries has strongly enhanced our own efforts to gain competency in our discipline. The linkage was especially strong where established through our graduate students and where our research and teaching commitments were oriented to their needs and aspiration, particularly for those students from foreign countries.

4. Soil Science Meetings

A workshop and soil symposium were developed by our staff. The former Soils of the Tropics was based at Prairie View, and the latter Simposium Sobre Suelos od Sabana en el Tropico, in cooperation with the University of Puerto Rico, was based in Santo Domingo, Dominican Republic and presented in Spanish. Both efforts substantially increased our knowledge of tropical soils through the participation of scientists from diverse locales. Probably the greatest advantage came from the linkage established between our staff and the visiting scientists. Relationships such as these have already borne fruit through the establishment of linkage between several institutions.

5. Commission on Savanna

Through the symposiums referred to above, the creation of a Commission on Soils of the Savannas had been proposed and initial contacts made to convene a charter core of scientists interested in fostering this commission.

6. Student Programs

We are committed to graduate studies in soils at Prairie View, because our competency in soils of the tropics can be strengthened through a strong teaching and research program, at the same time leaving a legacy for the perpetuation of this knowledge through students. About one-half of our graduate enrollment are American while the remainder are nationals from tropical countries.

7. Teaching and Research

Progress has been made in the competency-based instructional systems through improvements in the module format and accompanying materials in agronomic subjects. Additional lecture and laboratory space was acquired for teaching as well as new audio-visual materials. Several soil courses originally proposed in 1972 were approved and presented during this report year. As before, our research commitment is to solve problems that directly affect the quality of rural life of the small farmer. This research involves testing simple innovations under systems of intensive cropping. Most farming enterprises in the tropics are carried out within small acreages under intensive cultural systems and with limited resources.

8. Future Plans

Plans for the following year include a Soils Workshop, expanded to include more disciplines and their relationships to soils and agricultural growth. A lecture series for the porposed Tropical Soils Institute to be held at IRRI in the Philippines is being planned. Several proposals for a University Consortium network between member institutions, LDC institutions, and supporting agencies have been formulated.

Of paramount importance we hope to isolate seminal constraints to the development of savanna lands from on-site assessments made during several tours of African and South American savannas. This information would enable us to design relevant research which would attenuate these conditions or constraints that hamper human development in these areas.

F. DETAILED REPORT

1. General Background and Purpose of the Grant: A major concern of the Foreign Assistance Act of 1961 (Amended 1966) is to help overcome the confinements to human development brought about by agricultural systems that cannot cope with increasing populations and rising aspirations for a better life. To help accomplish this end, an Institutional Grant Program was established under Section 211(d) of the act which, in part, provided funds to enhance the competency of agricultural scientists in tropical soils encompassing research, teaching, and services. Experience has shown however, that competency in soil science is not enough to master the complexities of agricultural development. That to intelligently assess the seminal problems which hinder development or to design research projects relevant to the solution of these problems, a sensitivity to the social, political, and economic mores of the people is required as well. The primary objective given to Prairie View A&M College under the Grant Program implicitly infers this overall aspect of development stating "...assist in the development of food and fiber production in the humid tropics where specific attention will also be given to typical soil fertility problems under ecological conditions associated with the development of Savanna-Prairie vegetation." It becomes therefore, our major effort within the purposes of the grant to ultimately offer technical assistance directly to the rural poor in a manner that is acceptable to him and within the limits of his ecological system and resources.

2. Objectives of the Gr

Objectives restated: To achieve the purposes of the grant stipulated above, certain conditions of objectives must be fulfilled. The grant specifically delineates these as follows:

2.1 Provide senior faculty as complementary staff to present soil science staffing and to provide additional staff strength as required.

2.2 Provide visiting professorship and consultants through which Prairie View can bring to its campus additional expertise and experience in tropical soils science program and curriculum, in coordination with other participating Grant Institutions.

2.3 Provide student assistantships for research on tropical soils.

2.4 Modify and upgrade existing soils courses and develop new courses in tropical Soil Science which will strengthen the capability of personnel preparing to be engaged in tropical soil and crop management activities.

2.5 Strengthen library and other informational services and provide support for the preparation of training and teaching materials for a basic comprehensive soils program which can be related to tropical soil science.

3. Review of Objectives: This year, as before each objective is considered important, however, to meet the purposes encompassed in the grant; objectives 2.3 and 2.4 have received the greatest effort by the staff. Coupled with this effort has been an intensive program to visit tropical ecosystems. Only in this way can the agricultural scientists become familiar with the interrelated and complex problems of human development associated with a particular area.

4. Accomplishments

4.1 Information acquisition

Substantial amounts of information concerning tropical soils were gained from the seminars and discussions with the consultants listed in Table 1.

Table 1. Contribution by consultants and area of expertise in Tropical Agriculture to Prairie View A&M College during period of this report.

| Name | Institutions | Subject |
|---|---|---|
| Dr. Khalid Ashraf | Cornell | Agricultural Economics |
| Dr. Humphrey C. Ezumah | Hawaii | Root Crops |
| Mr. D. Levandowsky | AID/Texas A&M (Ret.) | Savanna Ecology |
| Dr. Jose F. Alfaro | Utah | Water Management |
| Dr. Idlefonso Pla | Venezuela | Soil Management |
| Dr. H. O. Kunkel | Texas A&M | Agriculture in World Affairs |
| Dr. W. P. Kuvlesky | Texas A&M | Research Needs for Rural Poor |
| Dr. J. A. Morris | Alcorn A&M | Research Needs for Rural Poor |
| Dr. L. Mugwira | Alabama A&M | Research Needs for Rural Poor |
| Dr. J. Gray | Teaxas A&M | Youth in Agric Development |
| Dr. Elemer Bornemisza | Costa Rica | Soil Fertility |

Dr. H. C. Ezumah and an assistant searched agricultural and ecological journals back to the year 1926, for information concerning savanna ecosystems.

Papers were copied and filed into the Soil Resource Center at Prairie View A&M College.

Textbooks and journals have been continuously acquired during the year to increase the collections in the Soils Resource Center. Rich sources of information were made available from the following:

(a) Catalog of F.A.O. Publications 1945-68 Rome

(b) "UNESCO" 1937 - UNI Pub., New York

(c) United Nations Office of Public Information, Specialized Agencies, New York, N. Y.

Guidelines were prepared to assist staff in the acquisition of important information during on-site scientific visits. (See Appendix).

4.2 APL Plus File System

The APL (A Programmed Language) Computer terminal was acquired through the Texas Agricultural Experiment Station and placed in the Resource Center at the disposal of staff also working under the 211(d) grant. This year the initial project for data processing concerned the entry, retention, and access of the biodata of scientists working in savanna areas world-wide. The variables for each component (scientist) consist of: name, year, positions, institution, address, education, discipline, speciality crop, geographical areas of work, languages, service, duration of service, and date available.

A computer program for information storage has been designed and given the name (ADDNAMES). The raw data is obtained from the questionnaires sent from Prairie View by a research assistant to scientists at

agricultural institutes and agencies world-wide. The questionnaire generally follows the format suggested by North Carolina State University during the last executive meeting of the Consortium.

The unique feature of this computer file system permits retrieval of any combinations of data. For this purpose a program is presently being designed to retrieve the information by any classification desired. The name of this program is (SEARCH).

4.3 Institutional Linkage

Although the term "linkage" is not clearly defined, we shall consider this term to imply a relevant interchange with institutions concerned with agricultural resource development and encompassing student and staff exchanges and cooperative research efforts. This year we have established the following linkages primarily through our graduate student program. This includes private companies as well.

(a) International Institute of Tropical Agriculture (IITA) Ibadan, Nigeria

(b) Complejo Industrial Pedernales, SA. Dominican Republic (Agricultural Chemicals).

(c) Central Agricultural Station, Mon Repos, E. Coast Guyana, South America

(d) Njala University College, University of Sierra Leone, West Africa

Hopefully, as the staff increases its number of visits to savanna areas of the world, additional linkage will be established with indigenous institutions. At the time of this report several tours had been planned including Frankaphone and Anglophone countries of sub-Saharan Africa and N. E. South America.

Tentative plans for a linkage network were formulated and presented to the Consortium Executive Committee during their last meeting held at Prairie View A&M College.

Through the Consortium linkage, we were able to place Mr. Cesar Lopez, M.S. student in Soils at Prairie View in the doctoral program at North Carolina State University. From the University of Hawaii, we obtained the professional service of Dr. Humphrey C. Ezumah, agricultural scientist specializing in tropical root crops for the period encompassed in this report.

As a result of the Symposium on Soils given in the Dominican Republic, Dr. Alfaro (See Section E-4) hosted our visit to Utah State University where methods of information storage and retrieval through Fortran programming systems were discussed.

A comprehensive library file containing lists of publications relevant to special topics in water and soil management were obtained from Utah State University and incorporated into the collection of Prairie View's Resource Center.

A very important effort to create institutional and personal linkages as well as increase the awareness of the staff to problems of agricultural production under diverse ecosystems was on-site visits to research institutions, and conferences. The following indicate the visits made by our staff:

| Name | To | Purpose |
|---|---|---|
| James I. Kirkwood | Ft. Collins, Colorado | To participate in a meeting representing the AID Consortium at the Council of U.S. University for Soil and Water Development in Arid and sub-Humid areas. |
| Johnnie B. Collins | Muscle Shoals, Alabama | To participate in a Forage Fertilization Symposium-TVA. In order to enhance expertise and give depth to the Plant and Soil Science Program at Prairie View. |
| Johnnie B. Collins | Miami, Florida | To participate in the Annual Meeting of the American Agronomy Society and give leadership to Prairie View A&M College Agricultural students. |
| Eugene A. Brams | Austin, Texas | To attend shortcourses sponsored by the National Science Foundation. |
| Johnnie B. Collins | Batesville, Ark. | To serve as coach for the Prairie View Soil Judging Team in the Region IV soil judging contest at the University of Arkansas. |
| Eugene A. Brams | Miami, Florida | To participate in the Annual Meeting of the American Agronomy Society. |
| Johnnie B. Collins | College Sta., Texas | To participate and moderate sessions of Texas Soil Survey Technical Work-Planning Conference. |
| James I. Kirkwood | Logan, Utah | To consult with the Director of the On-Farm Water Project, a retrieval system, on matters relative to utilization of this system at Prairie View A&M College using APL for data on Savanna soils. |

| Name | To | Purpose |
|---|---|---|
| Robert H. Dixon | College Sta., Texas | To consult with Dr. Warren Anderson on zinc-soil analysis. |
| Eugene A. Brams<br>James I. Kirkwood<br>Johnnie B. Collins<br>Yung Ping Chang<br>Humphrey C. Ezumah | Dallas, Texas | To participate in seminars at five Dallas high schools, discussing the Tropical Soils Program at Prairie View A&M College |
| Johnnie B. Collins | Temple, Texas | To confer with principals and counselors concerning development of interest of students in International Programs in Soils at Prairie View A&M College. |
| Eugene A. Brams | Houston, Texas | To attend and participate in the 76th Annual Academy of Science Meeting. |
| Eugene A. Brams | Mayaguez, P. R. | To present a series of lectures for the Institute of Tropical Soils at the University of Puerto Rico. |
| Robert H. Dixon | Mayaguez, P. R. | To participate in Tropical Soils Shortcourse. |
| Ronald Harvey | Mayaguez, P. R. | To participate in Tropical Soils Shortcourse. |
| Yung Ping Chang | Mayaguez, P. R. | To participate in Tropical Soils shortcourse. |
| James I. Kirkwood | Santo Domingo, D. R. | To coordinate and participate in the Tropical Soils Symposium with the University of Puerto Rico. |
| Yung Ping Chang | Santo Domingo, D. R. | To participate in the Symposium of Soils of the Savanna in the Tropics sponsored by Prairie View A&M College. |

| Name | To | Purpose |
|---|---|---|
| James I. Kirkwood | Mayaguez, P. R. | To participate in the Tropical Soils Workshop sponsored by the University Consortium for Tropical Soils. |
| Eugene A. Brams | Mexico City, Mexico<br>Turrialba, Costa Rica<br>CIMMYT, Mexico | To participate in the American Association for the Advancement of Science National meeting on Tropical Ecosystems and visit research institutions in Central America. |

4.4 Soil Workshop and Symposium

The Soils Workshop was held at Prairie View A&M, October 2-6, 1972, with the University Consortium on Soils of the Tropics cooperating. In addition to the staff at Prairie View A&M, participants included:

| | |
|---|---|
| Dr. M. Drosdoff<br>Cornell University | Cultural Systems on Tropical Soils |
| Dr. G. Uehara &<br>Dr. P. Ekern<br>University of Hawaii | Utilization of Soils in Hawaii and Southeast Asia |
| Dr. P. Sanchez<br>N. Carolina State University | Physical & Chemical Properties of Tropical Soils as Related to Plant Nutrition |
| Dr. R. Pietri<br>University of Puerto Rico | Utilization of Soil in the Caribbean Area |
| Dr. Murray Milford<br>Texas A&M University | Education and Training of Agronomists to meet the needs in tropical regions |
| Dr. John Malcolm<br>USAID/Washington, D. C | Education and Training of Agronomists to meet the needs in tropical regions |

Several members of governmental agencies also presented discussions, specifically in the area of soil mapping and land-use classification. The Proceedings of this workshop were published at Prairie View A&M, School of Agriculture as Bulletin No. 2, Soils of the Tropics.

5. A symposium on soils of the savanna was developed in cooperation with the University of Puerto Rico and coordinated through the efforts of Dr. James I. Kirkwood (Prairie View) and Dr. R. Pietri (University of Puerto Rico.) The Symposium was held in Santo Domingo, Dominican Republic and given in Spanish. Participants included:

| | | |
|---|---|---|
| Dr. F. Beinroth | Pedology | University of Puerto Rico |
| Dr. Ildefonso Pla | Soil Mgt. | Institute de Edafologia Venezuela |
| Dr. R. Pietri | Moderator | Univ. of Puerto Rico |
| Dr. Jose Alfaro | Water Mgt. | Utah State University |
| Dr. A. Van Wambeke | Pedology | Ghent State University Ghent, Belgium |
| Dr. Robert Fox | Soil Fert. | University of Hawaii |
| Ing. Agron C. Scherer | Soil Fert. | Estacion Experimental de Arroz, Brazil |
| Mr. Robert Cheaney | Soil Fert. | CIAT, Cali, Colombia |
| Dr. G. Samuels | Moderator | Univ. of Puerto Rico |
| Dr. F. H. Redman | Soil Fert. | Consejo Estatal del Azucar, Dominican Republic |
| Dr. E. Bornemisza | Soil Fert. | IICA, Lima, Peru |

Publication of the Proceedings is scheduled for Fall, 1973.

At the termination of the Symposium on Soils of the Savanna (see above) a committee was established to coordinate the creation of a Commission for Soil Studies of Savanna Areas of the World. The committee was chosen from members of the symposium and given the responsibility to contact scientists working in the savannas. The geographical areas were allocated as follows:

| | |
|---|---|
| Africa | Dr. F. Beinroth and Dr. E. A. Brams |
| Central America and Caribbean | Dr. R. Pietri and Dr. J. B. Collins |
| South America | Dr. I. Pla and Mr. Y. P. Chang |
| Asia and Oceania | Dr. J. I. Kirkwood |
| Australia | Dr. J. Alfaro and Dr. H. C. Humphrey |

6. Graduate and Undergraduate Programs

The strong commitment of our staff to education follows from our mandate as an institution of higher learning and our dedication to education as teachers. However, through teaching others we ourselves become more competent in our disciplines. At Prairie View, we orient our teaching and research to the needs of the student, his background and his commitment to human development in his own country or to countries requesting technical assistance. The table below shows the student enrolled (1972-73) in Plant and Soils, their respective projects, man-month and funding. Students funded directly from the 211(d) grant are identified with an asterisk.

| Name | Country | Activity Monthly | Funds AID | Research Activity |
|---|---|---|---|---|
| *Robert Dixon | U.S.A. | 60 hrs. | $300 | Zinc Movement in Prairie Soils |
| *Hilary Maduakor | Nigeria | 60 hrs. | $300 | Cadmium and Mercury Pollution of soils & produce: extent, effect and control. |

| Name | Country | Activity Monthly | Funds AID | Research Activity |
|---|---|---|---|---|
| *Charles Kargo | Sierra Leone | 60 hrs. | $300 | Production of Onion under Tropical and sub-Tropical Environments. |
| *Henry Normil | Haiti | 60 hrs. | $300 | Grass-Tropical Legume Pastures |
| *Lu Etuk | Nigeria | 60 hrs. | $300 | Reforestration of Land Under Shifting Culture |
| *Louis Andre | Haiti | 60 hrs. | $300 | Soil Sodium and Maize Growth |
| *Albert Agard | Guyana | 60 hrs. | $300 | Competency-Based Teaching Methods in Agronomy |
| *Ronald Harvey | U.S.A. | 60 hrs. | $300 | Characterisitcs of Several Soils of Prairie View Experiment Station |
| *Luis Tejeda | Dominican Rep. | 60 hrs. | $300 | Response of Tomato to Rock Phosphate and Superphosphate in South Texas Soils |
| Kelvin Kindle | U.S.A. | 60 hrs. | | Marketing Systems for Small Farmers |
| Robert Banks | U.S.A. | 60 hrs. | | Protein Content of Tropical and Subtropical Forages as Influenced by Fertilize Practices |

7. Education and Research:

Our educational philosophy, in part, recognized that the aspirations and needs of the student are paramount. The courses were designed and taught to make the information relevant to their needs. This is particularly important when teaching the foreign national students.

Our instructional methods are oriented to problem-solving and "brain-storming" techniques. We place great importance on field or on-site study in an attempt to improve cognitive learning by experiences in field and laboratory. Most of our courses are designed within performance-based (competency) systems.

New and improved graduate courses were presented during the academic year of this report. They are listed:

*603. Soil Mineralogy in Relation to Soil Formation. (Agro 603 Soil Mineralogy) (3-0) Credit 3. I. A study of weathering processes and products in relation to soil formation and effect of mineralogical composition on soil properties and profile characteristics.
PREREQUISITE: 9 hours of soil and 3 hours of physics or consent of instructor.

*703. Soil Fertility Problems of Savanna-Prairie Ecology. (Agro 703 Savanna-Prairie Ecology). (3-0) Credit 3. II. A consideration of management practices of Savanna-Prairie soils in relation to yields of pasture and row crops and on soil properties. Particular attention will be given to the effect of lime and rotational systems on efficiency of fertilizers under varying rainfall and temperature situations.

*753*. Soil Genesis, Morphology and Classification. (Agro 753 Soil Gen. and Class.) Credit 3. I. The principles dealing with the reasons why soils differ, how soils differ and how soils are related to one another and to the landscape in which they occur.

802. Special Problems. (Agro 802 Problems) (2-0) Credit 2. I. II. Students will select topics from agricultural sciences to develop investigative papers based on library, field, and/or laboratory sources.

733. Grain and Fiber Crop Production. (Plt. Sci. 733 Crop Production) (3-0) Credit 3. I. Study of grain and fiber ecology, utilization, physiology, morphology, cultural practices, and production.

A conference at Florida International University Miami, Florida was attended to develop methods of module preparation and evaluation.

As a result of the Consortium one of our graduate students was accepted into the doctoral program at North Carolina State University where he will continue his studies in soils and conduct research in crop and soil management in the international soils program.

Staff members attended two NSF Chautaugua-type short courses for college teachers (1) Water Pollution and, (2) Population, and several seminars on methods of preparing competency-based instructional modules.

Five graudate and undergraduate students and 4 staff members attended the American Society of Agronomy Convention at Miami Beach Florida where the staff presented two papers. For the first time, the Prairie View Agronomy Club participated in the Soil Judging Contest sponsored by ASA.

The Prairie View graduate students presented a seminar-panel to the staff and students at Texas A&M University, College of Agriculture in which the problems of agricultural development of their respective countries were discussed.

The research effort at Prairie View is centered around our graduate program. Projects undertaken by the staff always involve the graduate students. The projects are mission-oriented and in the area of applied science (See Section 5).

Publications and presentations of our research efforts during the period of this report are as follows:

1. J. I. Kirkwood, E. Brams, and Y. P. Chang. The People Left Behind: A World-Wide Concern. - ASA Meeting.

2. J. B. Collins and E. P. Whiteside. Characteristics of Spodosols Developed on a Sandy Topo-Biosequence in Michigan - ASA Meeting.

3. J. B. Collins, J. C. Polanco, and J. I. Kirkwood. Soil of the Savanna Guabatico-Dominican Republic. Departmental Technical Report No. 72-3.

4. E. Brams. Effect of Lime on pH, Acid Extractable P, and Al in Hockley Soils of the Texas Gulf Coast Prairie. Departmental Technical Report No. 72-2.

5. E. Brams. Agricultural Research - A Reply. Science, June 15, 1973 Vol. 180, No. 4090.

6. E. Brams. Residual Soil P Under Sustained Cropping in the Humid Tropics. Soil Sci. Soc. Proc., July-August, 1973.

7. E. Brams, B. Chopra. Effect of Growth Regulators on Uptake of Nutritive Ions and Yield of Soybean in Texas Gulf Coast Prairie. Texas Academy of Science. (In Press).

8. J. I. Kirkwood and E. C. Lopez. TAES Report. Growth Patterns of Fusarium SP under Different Concentrations of Two Urea Derivative Herbicides.

9. E. Brams. Plant and Soil 1973 (In Press). Soil Organic Matter and Phosphorus Relationships Under Tropical Forests.

Those publications directly resulting from grant activities are Nos. 1, 3, 5, 6, 8, and 9. The manner in which the publications relate to the objectives of the grant are implicit in the titles. Briefly, No. 1 was written to show that the soil scientist should transcend his narrow descipline and concern himself with all aspects of an ecosystems, particularily aiming his technology to aid the grassroot people in context of their limited resources. Number 3 attempts to present important soil parameters of savanna soils which limit crop production in the Dominican Republic. Knowing this, the soil scientist can plan relevant research to alleviate the constraints not only in this country but those of similar environment.

The publication No. 5 attempts to clear the air to the scientific community concerning the nature of agricultural science and its responsibility to the needs of people. The paper implicited elucidate the objectives of the 211(d) grant. The remaining articles, Nos. 6, 8, and 9 are technical papers which present soil information which can be used to develop and increase agricultural production in the tropics.

The acquisition of senior staff made possible through the grant has enhanced the teaching quality and commitments to the students of Prairie View A&M College. New courses have been added to the calendar and made available to other departments. This has resulted in a diffusion of new ideas, campus-wide, particularly in the realm of social and technological change as such changes affect the life of people everywhere.

The 211(d) grant has provided the research thrust that has increased the awareness of the staff and students to the complexity of the problems affecting the life of people living in rural poverty. For this reason, the staff has been increasingly involved as supporting personnel in projects concerned with rural development (See Section 6).

Travel to foreign institutions and countries as well as consultations with visiting scientists from diverse places have greatly expanded the sensitivity of the students and staff to the problems that beset people of different cultures. This has enriched the learning milieu and has in some measure invoked a change from the more pedantic education usually offered students to a creative, problem solving atmosphere.

The viability of the 211(d) program has strengthened our recruitment efforts and has increased the number of young people enrolled in the School of Agriculture and related fields.

7.1 Utilization of Institutional Resources in Development

The work dealing with maize as a second crop for Sierra Leone, W. Africa which is part of our 211(d) efforts has been expanded in that country. Several foreign graduate students involved in this work have visited Prairie View to discuss implementation of the project to fit different sites and conditions.

As previously stated, foreign students have been attracted to Prairie View as a direct result of personal linkages developed during staff conferences in Africa and workshops in the Caribbean areas. These students are now engaged in research relevant to problems in their country and their correspondence with colleagues has already disseminated information acquired here to help development in their country.

Our library acquisitions, particularly those dealing with agricultural development of savanna have been loaned to countries requesting specific information regarding these ecosystems. Countries such as Suriname, South America and Costa Rica, Central America have made requests for materials which have been sent.

Senior staff have been asked to participate in a Cropping Systems Symposium sponsored by the Instituto Interamericano de Ciencias Agricolas de la O.E.A. Turrialba, Costa Rica and in Ibadan, Nigeria.

7.2 Other Resources for Grant-Related Activities

In lieu of the fact that there is presently an acute shortage of classroom space, campus-wide, the administration at Prairie View has made available for the use of the students and staff of the School of Agriculture, an additional classroom in the Animal Industries Building. This

area has subsequently been modified into a laboratory-teaching unit for both undergraduate and graduate students in Plant and Soil Science.

The grant funded to Prairie View under the CSRS-USDA have aspects which can contribute to the objectives and purposes of the 211(d) grant. Information gathered from the results of these projects will substantially increase our knowledge of tropical ecosystems.

This year, research and development have been aided by the completion of three greenhouses. Several projects have already been started which include, (a) collection of tropical root crops and legumes, (b) salinity effects on maize.

8. Next Year's Plan of Work

The major efforts next year will be directed to the following: (a) Expansion of the data bank to permit storage of technical information concerning savanna ecosystems. A retrieval computer program is presently being designed to correlate the various parameters associated with the savanna. Analysis of these parameters might elucidate the major constraints to agricultural production in these areas, (b) Identification of seminal constraints to human development (by human development is meant, in part, increased agricultural production within the contexts of the mores of the people) and the relevant research to alleviate those constraints. (c) In addition, the following efforts will be continued in response to the responsibilities already undertaken during previous periods of the grant:

Develop graduate and undergraduate curricula in Soil Science, adding courses and/or strengthening present courses to emphasize soil fertility problems of tropical soils and savanna ecosystems.

Recruit additional staff and draw upon consultant and other advisory services. Recruit and select graduate and undergraduate students.

Acquire training and teaching materials such as visual and audio aids to complement course offerings in the soils program.

Acquire library holdings such as journals of disciplines related to soil science, films, microfilms, and slides. Films, filmstrips, and slides will be made where suitable ones cannot be acquired.

Develop a viable research project on soils of savanna to complement our present Institutional Grant.

Expand our present laboratory facilities and equipment.

Collaborate with other participating institutions for sharing of competencies and resources.

(d) Liaison with sub-Saharan African and South American countries through institutional scientists have been proposed and visits are being planned. (e) Plans have been formulated for another Tropical Soils Workshop to be held at Prairie View A&M. The format would be expanded to include Animal Science, Sociology, and Home Economics in an effort to relate soils and these disciplines in development schemes for tropical countries as well as South Texas. (f) A series of special lectures are being prepared for the Tropical Soils Institute to be held at IRRI in the Philippines. These lectures are designed to expand the themes of the Institute and include the broad topics of:

(a) Technology and Human Welfare

(b) Population Growth and Agricultural Development

(c) Responsibility of the Change Agent to the Rural Poor

(d) Competency-based Teaching of Agronomy

(g) Prairie View is cooperating with AID in developing a paradigm for a research network that would encompass the Consortium Universities, LDC's institutions, and governmental agencies world-wide. Sample models for the network were presented at the executive meeting of 211(d) held this year at Prairie View A&M College. (h) An expanded Seminar Program will include broad topics which conern relevant issues of agriculture in world affairs.

Several papers are scheduled for presentation during the American Society of Agronomy Meetings in November, 1973. These include:

1. The Development of a Generative Competency-based Instructional System in Agronomic Education. E. Brams, J. Shores, and P. Brams.

2. The Soils of the Savanna Quabatico-Dominican Republic. J. B. Collins.

3. The Adsorption and Strength of Bonding of Zinc in Texas Soils. A. S. Mangaroo, R. Dixon.

4. Tropical Savanna - A Potential Frontier for Increasing Food, Fiber. J. I. Kirkwood and Y. P. Chang.

5. The Movement of Pichloram and 2, 4, 5-T in Soils of the Texas Coastal Plains Under Simulated Rainfall Conditions. A. S. Mangaroo.

6. The Characteristics of Several Soils Developed on the Sandy Interior of the Texas Coast Prairie. R. D. Harvey and J. B. Collins.

9. Report of Expenditures

9.1 Distribution of 211(d) grant fund expenditures and contributions from other sources of funding (See Table 8.1).

9.2 Expenditure report, actual and projected (See Table 8.2).

9.3 Budget: Summary

| | | |
|---|---|---|
| Salaries and Wages | | |
| | Eligible for fringe benefits | $ 60,352.00 |
| | Visiting Professors | 2,576.00 |
| | Graduate Assistants | 25,812.85 |
| | Sub-professional assistants | 10,275.57 |
| | Total | 99,016.42 |
| Fringe Benefits | | 3,275.49 |
| | Domestic | 6,212.49 |
| | International | 5,236.60 |
| | Total | 11,448.94 |
| Communications | | 3,353,06 |
| Contractual | | 00 |
| Supplies | | 9,939.87 |
| Equipment | | 2,315.50 |
| Library Acquisitions | | 966.44 |
| | Total, all objects | 130,315.72 |

Table 9.1. Distribution of 211(d) grant fund expenditures and contributions from other sources of funding (review period July 1, 1972 to June 30, 1973).

| Object | 211(d) Source | | | | Non 211(d) Source |
|---|---|---|---|---|---|
| | Period Under Review | Cummulative Total | Projected Next Year | Projected to End of Grant | |
| Research | 51,127.85 | 73,631.27 | 43,000 | 25,000 | |
| Teaching | 63,627.49 | 123,393.26 | 70,000 | 75,000 | 32,000 |
| Libraries | 966.44 | 6,726.54 | 3,000 | 1,500 | 1,800 |
| Consultation | 2,576.00 | 2,576.00 | 3,000 | 1,000 | |
| Publication | 569.00 | 1,844.00 | 1,000 | 2,000 | |
| Travel | 11,448.94 | 16,476.69 | 16,000 | 18,000 | |
| Total | 130,315.72 | 224,647.76 | 136,000 | 136,000 | 33,800 |

Table 9.2. Expenditure report, actual and projected (review period July 1, 1972 to June 30, 1973).

| Object | Actual Expenditures | | Projected Expenditures | |
|---|---|---|---|---|
| | Period Under Review | Cummulative Total | Year 4 | Year 5 |
| Salaries | 69,639.01 | 123,454.45 | 75,000 | 82,000 |
| Student Asst. | 32,652.90 | 47,930.99 | 40,000 | 32,500 |
| Supplies and Materials | 15,608.43 | 30,059.09 | 2,000 | 2,000 |
| Library | 966.44 | 6,726.54 | 3,000 | 1,500 |
| Travel | 11,448.94 | 16,476.69 | 16,000 | 18,000 |
| Total | 130,315.72 | 224,647.76 | 136,000 | 136,000 |

Table 9.3. Travel

(1) Domestic

| Name | To | Cost | Purpose |
|---|---|---|---|
| James I. Kirkwood | Ft. Collins, Colorado | $ 261.61 | To participate in a meeting representing the AID Consortium at the Council of U.S. Universities for Soil and Water Development in Arid and Sub-humid Areas. |
| Johnnie B. Collins | Muscle Shoals, Alabama | 323.95 | To participate in Forage Fertilization Symposium-TVA. To enhance expertise and give depth to the Plant and Soil Science Program at Prairie View. |
| Yung Ping Chang | San Antonio, Texas | 53.30 | To attend a meeting on Vegetable Research as it related to savanna prairie ecology. |
| Yung Ping Chang | Houston, Texas | 11.75 | To participate in a greenhouse short course in support of special collections of tropical food crops. |
| Yung Ping Chang | College Station, Texas | 5.50 | To attend a research meeting at Texas A&M University. |
| Eugene A. Brams | Houston, Texas | 59.27 | To transport Drs. Matt Drosdoff, Goro Uehara, Pedro Sanchez from Houston International Airport to participate in Tropical Soils Workshop at Priarie View A&M College. |
| Johnnie B. Collins | Miami, Florida | 431.21 | To participate in the Annual Meeting of the American Agronomy Society and give leadership to Prairie View A&M College Agriculture students attending the meeting. |

(1) Domestic (cont'd.)

| Name | To | Cost | Purpose |
|---|---|---|---|
| Yung Ping Chang | Miami, Florida | $ 645.83 | To attend the Annual meeting of the American Agronomy Society and give paper. |
| Eugene A. Brams | Austin, Texas | 59.98 | To attend short course sponsored by the National Science Foundation in support of Soils Program |
| Humphrey C. Ezumah | College Station, Texas | 26.30 | To discuss aspects of a Cooperative Soils Research project with Texas A&M University Soils group and to consult with Dr. McWilliams on plant materials for tropical collection. |
| James I. Kirkwood | Logan, Utah | 338.38 | To consult with the Director of the On-Farm Water Project, a retrieval system, relative to utilization of this system at Prairie View A&M College using the APL for data on savanna soils. |
| Robert H. Dixon | College Station, Texas | 13.09 | To consult and work with Dr. Warren Anderson on thesis research. |
| James I. Kirkwood | Dallas, Texas | 140.07 | To participate in seminars at five Dallas high schools, discussing the Tropical Soils Program at Prairie View A&M College. |
| Garfield Hicks | Dallas, Texas | 100.94 | To participate in seminars at five Dallas high schools discussing Tropical Soils Program at Prairie View A&M College. |
| Ronald D. Harvey | Gainesville, Florida | 290.20 | To participate in the Microbiology of Crop Roots shortcourse in support of Soils Program. |

(1) Domestic (cont'd.)

| Name | To | Cost | Purpose |
|---|---|---|---|
| Johnnie B. Collins | Temple, Texas | $ 52.32 | To confer with principals and counselors concerning development interest of students in International Programs in Soils at Prairie View A&M College. |
| Johnnie B. Collins<br>Humphrey C. Ezumah<br>Eugene Brams<br>Y. P. Chang | Dallas, Texas | 172.93 | To participate in seminars at five Dallas high schools, discussing the Tropical Soils Program at Prairie View A&M College. |
| James I. Kirkwood | Washington, D. C. | 304.20 | To participate in the Executive Committee Meeting of the Tropical Soil Consortium. |
| James I. Kirkwood | Miami, Florida<br>Santo Domingo<br>Port-au-Prince | 700.31 | To participate in Annual ASA Meeting and give paper. Meet with seminar officials in Santo Domingo and Port-au-Prince. |
| Johnnie B. Collins | Batesville, Arkansas | 232.80 | To serve as coach for the Prairie View Soil Judging Team in the Region IV soil judging contest at the University of Arkansas. |
| Eugene A. Brams | Miami, Florida | 589.16 | To participate in the Annual meeting of the American Society of Agronomy and give leadership to several students attending the meeting. |
| Robert H. Dixon | Miami, Florida | 296.00 | To participate in the Annual meeting of the American Society of Agronomy. |
| Eugene A. Brams | Austin, Texas | 47.80 | To participate in shortcourse at the University of Texas and apply expertise gained to soils program at Prairie View A&M College. |

(1) Domestic (cont'd.)

| Name | To | Cost | Purpose |
|---|---|---|---|
| Oliver E. Smith | Athens, Texas | $ 20.00 | To confer with principals, Vocational Agriculture teachers and counselors on the performance of former agricultural students and give seminar on soils program. |
| Oliver E. Smith | Houston, Texas | 12.15 | To secure information on equipment and supplies for soils program. |
| Johnnie B. Collins | College Station, Texas | 26.18 | To participate and moderate sessions of Texas Soil Survey Technical Work-Planning Conference. |
| Yung Ping Chang | College Station, Texas | 13.09 | To confer with Dr. McWilliams regarding greenhouse operations at Prairie View. |
| Luis Tejeda | Houston, Texas | 12.15 | To attend and participate in the 76th Annual meeting of the Academy of Science and present a paper on research developed under the Soils Program. |
| Oliver E. Smith | San Antonio, Texas | 119.30 | To attend the Tropical Soil Emphasis Program. |
| Eugene A. Brams | Houston, Texas | 301.29 | To attend and participate in the 76th Annual Academy of Science meeting and present a paper. |
| Robert H. Dixon | College Station, Texas | 26.18 | To work with Texas A&M Soil staff on thesis research. |
| Cesar E. Lopez | Honolulu, Hawaii | 197.31 | To participate in a soil training program at the University of Hawaii. |
| Humphrey Ezumah | College Station, Texas | 59.67 | To collect research information on savanna ecosystem. |

(1) Domestic (cont'd.)

| Name | To | Cost | Purpose |
|---|---|---|---|
| J. I. Kirkwood | Washington, D. C. | $ 257.49 | To attend conference with AID officials. |
| Ronald Harvey | Houston, Texas | 10.64 | Travel to Houston International Airport to transport Dr. Pietrie to Prairie View A&M College for participation in Symposium. |

(2) International

| Name | To | Cost | Purpose |
|---|---|---|---|
| Eugene A. Brams | Mayaguez, Puerto Rico | $ 465.78 | To present a series of lectures for the Institute of Tropical Soil at the University of Puerto Rico. |
| Robert H. Dixon | Mayaguez, Puerto Rico | 234.00 | To participate in Tropical Soils shortcourse at the University of Puerto Rico. |
| Ronald D. Harvey | Mayaguez, Puerto Rico | 234.00 | To participate in Tropical Soils shortcourse at the University of Puerto Rico. |
| Yung Ping Chang | Mayaguez, Puerto Rico | 468.00 | To participate in Tropical Soils Workshop at the University of Puerto Rico. |
| James I. Kirkwood | Santo Domingo, D. R. | 972.98 | To coordinate and participate in the Tropical Soils Symposium with the University of Puerto Rico. |
| Yung Ping Chang | Santo Domingo, D. R. | 732.82 | To participate in the Symposium of Savanna Soils in the Tropics sponsored by Prairie View A&M College. |
| Normil Henry | Houston, Texas | 151.00 | From Port-au-Prince to Houston, Texas to enter Tropical Soils Program at Prairie View A&M College. |
| Charles Kargbo | Houston, Texas | 714.60 | From Sierra Leone, West Africa to Houston, Texas to enter Tropical Soils Program at Prairie View A&M College. |
| James I. Kirkwood | Mayaguez, Puerto Rico | 452.20 | To participate in the Tropical Soils Workshop sponsored by the University Consortium for Tropical Soils. |

(2) International (cont'd.)

| Name | To | Cost | Purpose |
|---|---|---|---|
| Louis Alix Andre | Houston, Texas | $ 211.90 | From Port-au-Prince to Houston, Texas to enter Tropical Soils Program at Prairie View A&M College. |
| Hillary Maduakor | Prairie View, Texas | 608.32 | From Lagos, Nigeria to Prairie View A&M College to enter Tropical Soils Program at the College. |

| | |
|---|---|
| Domestic Travel | $ 6212.34 |
| International Travel | 5236.60 |
| Total | $11448.94 |

Table 9.4. Equipment items costing over $ 50 each

| Item | Cost | Vendor |
|---|---|---|
| Typewriter IBM Selectric II | $ 530.01 | International Business Machines |
| Desk; steno chair; side chair; letter trays, lamps, costumer, storage cabinets, drawer file | 1,208.26 | Mayer Officer Furniture Company |
| Electric Multi Outlet Strip Electrical Outlet Spectrum Flexaframe End to End Connector | 89.40 | Curtain Scientific Co. |
| Bookcase | 50.00 | Newcomb Furniture Inc. |
| Transformer for A/C Unit | 58.91 | 21-250 Whse. Operation |
| Storage Cabinet; Axson file with lock | 378.92 | Texas Office Supply Co. |
| Total | $2,315.50 | |