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REPORT OF PRAIRIE VIEW A&M COLLEGE  
FOR THE PERIOD  
SEPTEMBER 1, 1971 TO JUNE 30, 1972

A. TITLE: A Grant to Strengthen the Capabilities of Prairie View A&M College in Relation to Soil Fertility Problems Under Savanna-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: \$94,332

3.2 Accumulated: \$131,608

3.3 Anticipated for next year: \$122,798

E. NARRATIVE SUMMARY

This year's major efforts have been directed towards achieving two objectives of the Prairie View 211 (d) Grant Program: (1) to establish strong undergraduate and graduate programs in Soils and (2) to increase the knowledge and competency of our staff with regard to the properties and management of tropical soils within the social and economic constraints of the rural poor and their cultural mores. In pursuit of these objectives, we have achieved the following.

1. A program has been established for a Master of Science degree in Soils with options in tropical soils and land-use planning (this program is expected to be approved by appropriate state agencies by September 1, 1972).

2. Linkages have been established with institutions in Sierra Leone, Ghana, and Nigeria, W. Africa to send one student from each country with

the appropriate Bachelor's degree to enter the program for the Master of Science degree in Soils at Prairie View A&M College through the Fellowship offered under the 211(d) grant.

3. Two Graduate Fellows sponsored by the fellowships made available in the 211(d) grant have received their Master of Science degree in Agricultural Education with minor studies in Soils. Another student completed requirements for the Master of Science in Soils. The degree will be awarded when the Master of Science in Soils is approved (retroactive). This student, a Dominican, with an undergraduate degree in Agronomy from Texas A&M University has returned to his country and is involved in lime-phosphorus studies in the Savanna areas as research director of a fertilizer company.

4. Prairie View A&M College has received over \$752,000 in CSRS grants for fiscal year 1972 to research the problems of rural poverty. This program began officially June 1, 1972. This funding has attracted new staff, added facilities, and increased student enrollment and is expected to continue indefinitely. These resources have strengthened our entire program in Soils. Several graduate students are studying in the area of land-use planning and soil aluminum-phosphorus interactions under intensive cultivation of cash crops on small acreages--an important segment of development in the tropics.

5. The entire staff is committed to performance-based teaching. In preparation, are modules for an introductory course in Soils of the Humid Tropics designed for use in African and Caribbean institutions using materials and problems relevant to those areas while placing emphasis on correct English usage and pronunciation. These materials, plus taped documentaries on the Gulf Coast Prairie soils of Texas,

land-use planning and work sheets on soil concepts are deposited in the Resource Center. Two Graduate Fellows sponsored by the 211(d) grant attended the Tropical Soils Institute in Puerto Rico, and another is continuing his studies in Soil Microbiology at the University of Hawaii as part of the student exchange program among consortium institutions.

6. The primary thrust of research in the Soils program is directed to the solution of basic agronomic problems which contribute to rural poverty. As one solution, a program of intensive cultivation of fruits and vegetables by rural people living close to large urban centers is being started as a means to better the quality of their lives and perhaps induce some migration from distressed urban centers to the countryside where a productive life is possible. The 211(d) Soils staff is also conducting experiments in simple cultural devices and procedures to stimulate a rise in production for subsistence farmers of the tropics. Devices such as stick cages instead of wire for tomato production have already shown great promise. Preliminary fertilizer trials have shown that use of finely-ground rock phosphate and legumes as fertilizer sources in rotations without lime can sustain good row crop yields in these South Texas soils which are similar to the soils of the humid tropical Savanna.

7. Staff under 211(d) have already collected samples from the Caribbean areas and they are now under intensive laboratory study. Results of this work have stimulated new soil correlations for South Texas soils, correlations which had not been recognized until these studies were initiated.

8. A main concern is the development of innovations in agronomic practices that will be accepted by subsistence farmers and directly increase

the income of the rural poor, not only in South Texas, but also in the tropics. In this endeavor teaching aids and extension procedures are being developed to enhance the overall program of agricultural development.

#### F. DETAILED REPORT

1. General Background and Purpose of the Grant: The grant was established to strengthen the United States' capacity to conduct technical assistance and education programs, pertaining to soil science, in areas of rural poverty not only in the continental United States but in other countries and in tropical regions committed to agricultural development.

Increases in national revenues of most tropical countries depend on greater agricultural production achieved through the family unit which is undergoing change from subsistence farming to modified commercial production. This change is very slow and a major emphasis must be placed on increasing the productivity, however small, of the subsistence farmer now.

Tropical soils strongly differ from temperate soils in morphology, properties, and response to treatments. In fact, they differ markedly from each other, reflecting the diverse environments and geomorphology of these regions. The diversity can be grouped into large biomes or similar environmental units such as high forest, upland swamp, arid and humid Savannah, etc. Each biome is a study in itself. The Soils staff of Prairie View A&M College has extensive experience with range soils and because Prairie View is situated on the prairie soils of South Texas, it was given the responsibility of accumulating information and developing competency in managing Savannah soils of the tropics.

## 2.1 Objectives restated

2.1.1 To develop a core staff, library and laboratory facilities and student support to assist development programs of food and fiber production in the tropics while resolving problems of soil fertility by means of research, technical assistance, and manpower training. Areas of concentration encompass growth of instructional media and curricula on tropical soils, recruitment of staff, and utilization of consultant and advisory services to structure a program that will increase the competency of Prairie View soil scientists in order to make substantial contributions to the agricultural development of tropical countries and to improve the life chances for people living in pockets of rural poverty in the United States.

2.1.2 Specific attention will be given to soil fertility and land-management problems associated with Savannah-Prairie ecology.

2.2 Review of objectives: None of the objectives stipulated in the grant have been modified or found more amenable than others. This year, efforts have been directed to provide the staff with the experiences that will familiarize them with the soil problems facing agricultural development in tropical regions and also including the rural poor in Texas. These experiences have been gained through participation in workshops, conferences, seminars, consultant meetings, professional society meetings, and visitations to foreign institutions of the tropics.

## 3. Accomplishments

3.1 Criteria for accomplishment: Accomplishments can be measured by the scientific performance of students and the degree of

their involvement in the agricultural and social development of their homelands. Accountability is also measured by the competency of the staff in recognizing the major soil problems of developing nations as well as designing reasonable and realistic programs to solve these problems. Based on this criteria, the accomplishments of the projects planned and written into last year's annual report (page D-22, 23) and the plans formulated for this year are summarized as follows:

### 3.2 Teaching

3.2.1 Projected plan (1971): Formal approval of a graduate program for the Master of Science degree in Soils.

Accomplished (1972): The program has been approved by the President of the College and is expected to be approved by the Board of Directors of the Texas A&M University System and the Coordination Board of Higher Education by the fall of 1972. Two options will be available: (1) Tropical Soils and (2) Land-Use Planning.

3.2.2 Projected plan (1971): The data in Table 3.2.2 show the number of graduate students that have applied for admission into the graduate program, the number accepted this year under the 211(d) sponsorship, and the number who have graduated or completed requirements for graduation.

3.2.3 Projected plan (1971): Interchange of staff between consortium universities and tropical institutions and participation in soil conferences and workshops.

Accomplished (1972): Three faculty members participated in the Soils Institute in Puerto Rico. One staff member attended the TVA Symposium on Forage Crops and another the Southern Regional Workshop

Table 3.2.2. Study area, national origin, and statistics of students in graduate program

Student No.	Study Area	National Origin
1 <sup>a</sup>	Soil Chemistry-Fertility	Nigeria
1 <sup>a</sup>	Soil Chemistry-Fertility	Sierra Leone
1 <sup>c</sup>	Soil Chemistry	Dominican Rep.
1	Soil Chemistry-Fertility	Dominican Rep.
1	Soil Classification (land-use planning)	United States
1 <sup>a</sup>	Soil Classification	Ghana
1	Soil Chemistry	United States
1 <sup>a</sup>	Soil Microbiology	Haiti
1	Soil Microbiology	Dominican Rep.
1 <sup>b</sup>	Agricultural Education	United States
1 <sup>b</sup>	Agricultural Education	United States
1 <sup>a</sup>	Agricultural Education	Guyana

<sup>a</sup>Applied for admission

<sup>b</sup>Graduated with M. S. degree in Ag. Ed. with minor in Soils

<sup>c</sup>Met the requirements for M. S. in Soils

at Tuskegee, Alabama. One member of the Soils staff attended the Conference on Tropical Soils sponsored by AID and the Ford Foundation at Ibadan, Nigeria.

3.2.4 Projected plan (1971): Exchange of graduate students between consortium universities.

Accomplished (1972): One graduate student in Soil Microbiology was accepted by the University of Hawaii to continue his work on the isolation of soil microorganisms that are able to degrade certain herbicides. Two students participated in the Tropical Soils Institute, University of Puerto Rico.

3.2.5 Projected plan (1971): Development of the Tropical Soils Resource and Enrichment Center.

Accomplished (1972): The College is committed to performance-based teaching methods and our staff has attended several workshops in the preparation of modules. With this commitment, the agricultural staff, using the facilities initiated by the 211(d) grant is preparing modules for the instruction of plant, soil, and animal science. The Tropical Soils Resource and Enrichment Center as a focal point has become the Agricultural Resources and Enrichment Center. Specifically in soils, a performance-based course entitled "Introductory Soils for the Humid Tropics," has been initiated. Today several modules have been prepared based on experience, data, and results of agricultural and soils studies of those regions. Slides and commentaries depicting the physical and social characteristics of the humid tropics are also being used.

Several auto-tutorial documentaries dealing with the role of soil science in land-use planning have been prepared. Tapes for supplemental

study were prepared dealing with soil concepts such as cation exchange, ph, etc.

Soil monoliths, artifacts, and rhizosphere zones were prepared from soil sites of South Texas, Caribbean areas, and W. Africa.

Collections of published materials and taped proceedings of conferences, workshops, seminars, and students were added to the Resource Center as well as a substantial number of technical journals in the field of Soils, Environmental Quality, and the Physical Sciences. As part of the enrichment program, 35 students and 4 staff members visited research centers, farms, and schools in the Rio Grande Valley to become better acquainted with the problems of agriculture in this subtropical area and methods to solve them. The trip was sponsored under 211(d) funds.

### 3.3 Research

3.3.1 Projected plan (1971): Study the mineralogy of Savannah-Prairie soils.

Accomplished (1972): Samples of Savannah soils from Caribbean areas were collected and are being analyzed, chemically and mineralogically. This information will be compiled as part of the Data Bank on Tropical Savannah soils. Soil samples from diverse sites in the South Texas Gulf Coast Prairie were also collected and are being analyzed. Results from this work have shown a need for further soil correlations by the Soil Conservation Service in the South Texas area.

3.3.2 Projected plan (1971): Study the management of grassland prairie under cattle culture and status of P, Al, and Ca in these soils.

Accomplished (1972): A lime requirement curve was established for the major soil series of this area. Effects of lime on exchangeable Al and P availability were ascertained (M. S. thesis). The effects of various lime levels on production of ryegrass was also studied.

3.3.3 Projected plan (1971): Initiate a research program which will serve as a basis for the development of projects to be funded under Cooperative State Research Service Special Grants Program for the Colleges of 1890 and Tuskegee. This program which would enhance the effectiveness of the 211(d) grant program is entitled "The Economic Potential of Intensive Farming on Small Acreages Near Large Urban Centers (and can serve as) an incentive for rural stabilization and immigration.

Under this project, three lines of investigation were to be pursued:

1. Evaluation of peach culture
2. Evaluation of small fruits (berries)
3. Evaluation of vegetables (tomatoes and sweet corn)

Accomplished (1972): A peach orchard was established comprising 10 acres of approximately 400 trees of June Gold variety and 5 acres of selected trees in a varietal trial consisting of 6 other varieties and trees to be used as root stock.

Six varieties of blueberries were established in an experimental block to test their adaptability to the Gulf Coast climate and soils.

A fertilizer test is being conducted on blackberries as part of management studies of small fruit.

An established tomato variety (Better Boy) for this region is being tested under three cultural systems; viz., open planting, staked, and caged. Plastic mulch was used in all trials to ascertain the relative effectiveness of the method on yield and quality.

Nine varieties of sweet corn were tested for maturity dates, yields, and quality; however, no results were obtained due to accidental damage to the planting. This test is being repeated.

3.3.4 Projected plan (1971): Begin pesticide studies on Prairie soils.

Accomplished (1972): Analysis of several hundred soil samples from South Texas. These samples were analyzed by gas chromatograph for content of residual herbicides. A graduate student is presently working on the isolation of microorganisms that are able to degrade certain resistant herbicides.

4. Impact of Grant-Supported Activities in Developing Institutional Capabilities: The grant has substantially increased participation in workshops, conferences, institutes, and seminars. The grant has enabled staff members to travel to tropical regions and associated institutions gaining valuable experiences in on-site situations, and working with personnel directly involved in agricultural development.

The main research thrust is an applied approach to directly and immediately aid the rural poor, not only in tropical regions, but in the United States as well. Innovations that enhance the quality of rural life here can be, in part, extrapolated to tropical environments elsewhere because many agronomic aspects of the poverty problems within the environs of Prairie View are strikingly similar to other regions irrespective of the cultural differences that may mask the situations.

Thus, the input of 211(d) has enabled Prairie View to contribute directly to the welfare of people, nationally and internationally. The philosophy of direct aid to the small farmer has given a new image

to agriculture and has imbued talented undergraduates to seriously consider careers in agriculture.

5. Utilization of Institutional Resources in Development: As stated in Section 3, student linkages have been established with several African and Caribbean countries. Facilities such as the Learning Resource Center in the library, the Teaching Center, and the Language Center are available in support to their training and enrichment.

Library holdings including facilities and collections are quite adequate at present. Future collections will include microfiche materials of foreign periodicals and collections from large libraries.

Research on maize as a cash crop for the uplands of Sierra Leone conducted by a staff member is directly in line with the idea of innovations annexed to the subsistence based farming that can materially increase the small farmers' income without any drastic change in his mores or traditional methods.

During a trip to the Dominican Republic to collect soil samples of Savannah areas for intensive study, three staff members consulted agricultural administrators and business leaders as to the levels of priority assigned problems in their country.

6. Other Resources for Grant-Related Activities: The CSRS grants awarded to Prairie View entail three major research thrusts:

- (1) Improving critical life chances, social conditions, and economic resources of disadvantaged minority populations and communities in selected southeastern Texas counties
- (2) Determination of economic opportunities for rural families in southeast Texas to improve their incomes
- (3) Improvement of the environment in rural areas close to urban centers (Houston, Galveston, Beaumont Triangle of South Texas)

Each thrust or objective has provided research and instructional personnel whose involvement easily meshes with the 211(d) objectives. These inputs have and will enhance our capabilities to increase student participation in soil studies, enrich our library collections and improve the laboratory equipment and supplies.

A 211(d) grant staff member is the project leader for a project submitted under the Agricultural Research Program "Determination of Economic Opportunities for Rural Families of Southeast Texas to Improve Their Incomes." The project is entitled "Analysis of Technical and Economic Problems in Alternative Systems of Producing and Marketing Selected Vegetables in the Texas Gulf Coast Area." The amount granted for this project was \$131,355. Initial funding to begin the project was received from CSRS June 1, 1972.

The vegetable project ties in with 211(d) objectives and helps develop our expertise in working with small farmers with limited resources.

## 7. Next Year's Plan of Work

7.1 Fifteen (15) graduate students in Plant and Soils next year are anticipated, of which 10 will be funded through the 211(d) grant. This will be achieved through a concentrated recruitment program which is campus-wide.

7.2 A four-day workshop in Tropical Soils for agriculturists of several institutions and governmental agencies, particularly the 1890 colleges, is planned for October. Visiting professors from consortium universities have been invited to participate.

7.3 Prairie View A&M College and the University of Puerto Rico plan to co-sponsor a seminar on Savannah soils to be held in the Dominican Republic in January.

7.4 An expanded seminar series in the School of Agriculture is planned to include foreign nationals and members of FAO.

7.5 The graduate program for the foreign nationals indicated in Table 3.2.2 will have started and visitations by respective staff to institutions of developing countries is planned in regard to research projects of both students and staff.

7.6 Further development of performance-based teaching modules for all introductory courses in Soil and Plant Science. Particular emphasis will be placed on teaching modules for students in African universities whose experience and objectives are different than ours.

7.7 The staff plans to present a panel during the Agronomy Society of American Meeting dealing with new concepts of development in tropical countries--a grassroot approach. One staff member plans to present a paper on Soil Classification at this same meeting.

7.8 The research accomplishments listed in Section 3 merely represent a part of the long series of units of work involved in each project. Plans will include expanding the research thrusts indicated in this year's report.

7.9 Four more research proposals which coordinate closely with the 211(d) program will be submitted for CSRS funding for FY '73.

They are as follows:

- (1) Economic feasibility of producing and marketing selected fruits in the Texas Gulf Coast area

- (2) Analysis of the technical and economic factors in the production and marketing of feeder and stocker calves on small farms in the Texas Gulf Coast area
- (3) Heavy metal pollution of soils: Effects on agricultural produce of areas adjacent to urban centers
- (4) Assessment of pollutants in rural water supplies

8. Other: No additional report.

9. Report of Expenditures

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

9.2 Expenditure report, actual and projected (see Table 9.2).

9.3 Budget: Summary

Salaries and Wages

Eligible for fringe benefits	\$41,637.23
Visiting professors	297.00
Graduate assistants	15,278.09
Sub-professional assistants	7,359.13
<b>Total</b>	<b>64,571.45</b>
<b>Fringe Benefits</b>	<b>2,263.97</b>
<b>Travel</b>	
Domestic	2,593.00
International	2,434.75
<b>Total</b>	<b>5,027.75</b>
<b>Communications</b>	<b>584.07</b>
<b>Contractual</b>	<b>0</b>
<b>Supplies</b>	<b>11,047.40</b>
<b>Equipment</b>	<b>5,077.30</b>
<b>Library Acquisitions</b>	<b>5,760.10</b>
<b>Total, all objects</b>	<b>\$94,332.04</b>

Table 9.1. Distribution of 211(d) grant fund expenditures and contributions from other sources of funding (review period September 1, 1971 to June 30, 1972)

Object	211(d) Source				Non 211(d) Source
	Period Under Review	Cumulative Total	Projected Next Year	Projected to End of Grant	
Research	22,503.42	30,460.95	36,399	92,000	
Teaching	59,765.77	79,721.81	70,000	122,000	32,000
Libraries	5,760.10	11,753.11	4,000	7,000	1,800
Consultation			2,399	2,500	
Publication	1,275.00	1,275.00	2,000	2,500	
Travel	5,027.75	8,396.97	8,000	19,594	
<b>Total</b>	<b>94,332.00</b>	<b>131,608.00</b>	<b>122,798</b>	<b>245,594</b>	<b>33,800</b>

Table 9.2. Expenditure report, actual and projected (review period September 1, 1971 to June 30, 1972)

Object	Actual Expenditures		Projected Expenditures		
	Period Under Review	Cumulative Total	Year		
			3	4	5
Salaries	55,815.44	71,257.66	70,000	60,000	60,000
Student Assistants	15,278.09	20,721.80	36,000	45,000	45,000
Supplies and Materials	14,450.66	19,478.30	4,798	4,500	4,500
Library	5,760.10	11,753.11	4,000	3,500	3,500
Travel	5,027.75	8,396.97	8,000	9,797	9,797
<b>Total</b>	<b>94,332.00</b>	<b>131,608.84</b>	<b>122,798</b>	<b>122,797</b>	<b>122,797</b>

## 9.4 Budget: Detail

## 9.4.1 Salaries and wages

<u>Name and Position</u>	<u>Percent of time on project</u>
James I. Kirkwood, Professor and Research Coordinator	50
J. B. Collins, Professor	100
E. A. Brams, Professor--Soils	100
Y. P. Chang, Research Associate	100

9.4.2 Travel

(1) Domestic

<u>Name</u>	<u>To</u>	<u>Cost</u>	<u>Purpose</u>
Cesar E. Lopez	Hawaii	198.34	To University of Hawaii in support of 211(d) tropical science grant
School of Agriculture group	Weslaco, Texas	594.30	Greyhound bus for tropical soils enrichment field trip to Rio Grande Valley
Johnnie B. Collins		70.25	Recapitulation of retroactive travel expense claims due as a result of presidential freeze
James I. Kirkwood		50.20	Recapitulation of retroactive travel expense claims due as a result of presidential freeze
Roger E. Savain	Houston, Texas	9.40	To discuss the printing of the <u>Agronews</u> , the School of Agriculture newsletter, with the Gulf Coast Negative Service
Roger E. Savain	Houston, Texas	9.40	To proof read the materials for <u>Agronews</u> , the School of Agriculture newsletter, at Yates Printing Company
Julio Polanco	Houston, Texas	30.00	To attend gas chromatography training
James I. Kirkwood	Montgomery, Ala.	253.28	To attend and participate in a meeting of the Southern Agricultural Workers in Tuskegee, Alabama and to transport two students on a field trip to Tuskegee Research Institute, Tuskegee, Alabama
James I. Kirkwood	Honolulu, Hawaii	457.77	To attend an Executive Committee Conference to prepare an Annual (Consortium) Report to be submitted to the Agency for International Development, Washington, D. C., December 1971

(1) Domestic (Cont.)

<u>Name</u>	<u>To</u>	<u>Cost</u>	<u>Purpose</u>
James I. Kirkwood	Washington, D. C.	367.95	(1) Annual Review for 211(d) grant (2) Workshop for research coordinators
Eugene A. Brams	Muscle Shoals, Ala.	270.50	To attend a 5-day short course at the National Fertilizer Development Center
James I. Kirkwood	Muscle Shoals, Ala.	279.31	To attend a 5-day short course at the National Fertilizer Development Center

(2) International

<u>Name</u>	<u>To</u>	<u>Cost</u>	<u>Purpose</u>
Eugene A. Brams	Lagos, Nigeria	1,335.05	To participate in the Tropical Soils Research Seminar held at the University of Ibadan, the International Institute of Tropical Agriculture and Kumasi
Johnnie B. Collins	Santo Domingo, D. R.	655.75	To secure and arrange transport of soil samples, to conduct at Prairie View A&M College, mineralogical studies of the mineral colloidal fraction of these soils in an effort to correlate the character- istics of this fraction with similar frac- tions of other soils of tropical and sub- tropical origin
Cesar Polanco	Santo Domingo, D. R.	443.95	To collect, describe and sample varying soil types in the Dominican Republic
	Total	\$5,027.75	

## 9.4.3 Equipment items costing over \$100 each

<u>Item</u>	<u>Cost</u>	<u>Vendor</u>
Soil core sampler cylinder, 6-cm long	\$ 148.45	Soilmoisture Equipment Co.
Beseler camera (35mm)	490.00	Texas Educational Aids
Fume hood; water still; balance Mettler	2,953.00	Curtin Scientific Co.
Technicolor 810WS, instant movie projector	238.50	Texas Educ. Aids
No. 8636 drawer file with key lock	255.49	University Microfilms
Soil moisture meter; soil moisture blocks; battery	154.70	Soil Moisture Equipment Co.
Troug soil tester reagent N	158.48	Hellige, Inc.
Hoffer soil sampler	268.68	NASCO
Univ. photo inter- preter's group stereoscope	410.00	Stratex Instrument Co., Inc.
	<hr/>	
Total	\$5,077.30	