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IMPROVEMENT of the INTERNATIONAL CAPABILITIES of UNIVERSITIES (The 211(d) Projects)

ANNUAL TECHNICAL REPORT NO. 2
1969-70

submitted by

Council of U. S. Universities for
Rural Development in India

CUSURDI
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(The 211(d) Projects)

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THE COUNCIL OF UNITED STATES UNIVERSITIES FOR RURAL DEVELOPMENT IN INDIA

INTRODUCTION

This is the second consolidated report on the Section 211(d) Grants to the six universities that are members of the Council (CUSURDI). Council members are: University of Illinois, Kansas State University, University of Missouri, The Ohio State University, The Pennsylvania State University, and University of Tennessee.

The Land Grant Universities have made important contributions to world agricultural development. Since the early days of the Point-4 Program, they have been called upon to provide technical assistance to the developing countries. More recently, many countries have become interested in assistance to adapt the Land Grant College model to their own environment.

In keeping with the growing world role of the American Universities, there has been an expanding interest at these institutions in the world food problem, world agriculture, and the processes of economic growth. But the limited state funds available for international studies, and the fortuitous, transient, and irregular support from other sources for international activities did not provide a secure financial base upon which institutions might commit their resources and scholars commit their careers. As a result, the American Universities have not exploited their full potential to help developing countries to improve their agriculture and to develop more effective agricultural institutions for research, training and action.

This deficiency has been recognized by the universities, the Agency for International Development, and the Congress.

In 1966, Section 211(d) was added to the Foreign Assistance Act providing that the Agency for International Development could support "research and educational institutions in the United States for the purpose of strengthening their capacity to develop and to carry out programs concerned with economic and social development of less developed countries."

In discussing this legislation, the Congress suggested certain philosophical guidelines for the new programs. These programs were to center on a joint university-federal government approach to strengthening the nation's research and education capability, in connection with technical assistance efforts determined to be in the national interest. The program was to give broad scope to the universities in planning and executing the activities needed to achieve the agreed upon objectives.

The 211(d) Program at CUSURDI Institutions

The Council of U.S. Universities for Rural Development in India early expressed a keen interest in involving its member universities in activities that might be supported by funds from the 211(d) authorization. It felt that with the opporutnities to jointly develop project objectives, and the flexibility and freedom of action permitted under the grant procedure, the member institutions would develop innovative and imaginative programs.

Each of the six United States Universities that is a member of the Council of U.S. Universities for Rural Development in India entered into an agreement with AID for a project under Title II, Section 211(d) of the Foreign Assistance Act in May 1968. Responsibility for execution of these projects rests with each of the member universities. The Council (CUSURDI) serves as a coordinating and planning body with AID and with USAID/India.

The universities sought participation in the 211(d) program in a spirit of mutual participation with the federal government. They recognized the desirability of joint planning and the need for their programs to contribute to broad objectives as set forth by the Congress. They also recognized and supported the need for fund accountability and program review.

The proposal submitted to AID for institutional grants described the following objectives of these grants:

1. To increase the capability of these six U.S. educational and research institutions to render assistance to developing nations and generate increased public awareness of the significance of the international service dimension of university education and research.

2. To increase the pool of manpower with capabilities of rendering assistance to developing nations.

3. To assist in the development of international service faculties in the Council Universities and act as a catalyst in the expansion of interest in professional international service careers.

4. To encourage college students (Undergraduate and graduate) to seek careers in foreign assistance work.

5. To more effectively use present U.S. field personnel in the developments and training of candidates for professional service positions in developing countries.

6. To develop a corps of experts in the various phases of agricultural development which will be available as consultants in the evaluation and solution of problems in which there is a national interest.

Since the objective of CUSURDI is centered on development of Indian Agricultural Universities and Indian agriculture, the international focus of the 211(d) projects is upon the problems of Indian agriculture, although some attention may also be given to other regions.

Fields of concentration of the six universities in CUSURDI are as follows:

Illinois: Identification, causes, and control of agronomic crop diseases.

Kansas: Improved grain utilization.

Missouri: Breeding of agronomic crops.

Ohio: Soil-plant-water relationships.

Pennsylvania: Crop production and management.

Tennessee: Economic Issues of Agricultural Development.

Annual technical reports for each of the six 211(d) projects for the year 1969-70 have been submitted to AID by the universities. This report from the Council combines the individual reports as submitted by the universities, presents highlights of some of the more significant activities and presents some generalizations on the significance of the 211(d) activity in relation to growth of other international activities at these institutions. This is the second annual report of CUSURDI on these projects.

Progress in the Second Year

This section provides an analytical overview of progress reported in the separate university reports in the strengthening of the international dimension of the universities in teaching, research, and service activities, and in the expansion of the university horizon in general. While the reports seek to account for progress made specifically under the grants, they go beyond this to report on other efforts at internationalization, because a broadening of interest and viewpoint on the part of university administration, boards of control, and state legislators is an indication of a favorable climate within which the effects of the modest 211(d) grants can be multiplied.

Strengthened Capacity for Teaching

Significant progress is being made through the 211(d) grants in enriching and strengthening teaching in the cooperating departments and this influence is extending beyond departmental lines.

The international aspects of several courses are getting more attention at all universities, and a number of new courses are being added. The Department of Agronomy at Ohio State is using its own funds to add three new graduate courses including one in sugarcane physiology and nutrition, and is offering a five week summer course in agronomic aspects of world food production. This course brings together five outstanding crop and soil scientists. Only one was paid for by 211(d) funds, but the course would not have been offered without the stimulus provided by the 211(d) program. Tennessee is offering a new Ph.D. concentration in the Economics of Agricultural Development and has two new economic development and planning courses with strong international applicability. These are taught by the 211(d) professor. At Illinois, the 211(d) professor has taken the lead in working with the Departments of Plant Pathology, Hoticulture and Economic Entomology in planning a course on International Food Crops. At Penn State and at Kansas State, the universities are adding a course in Tropical Crop Production, utilizing regular university funds. In Missouri, the 211(d) professor and one of his graduate students have helped with a series of agronomy seminars on international topics, and, in teaching a course in plant breeding he is emphasizing the contributions to international agricultural development.

The 211(d) professors and their graduate students are contributing to the supply of teaching materials for world agricultural development. For example, in Missouri, the 211(d) professor has collaborated with an Indian agronomist to produce a textbook: "Breeding Asian Field Crops." In Tennessee, the 211(d) professor and others are developing teaching materials in cooperation with their students. With a 'workship' provided from 211(d) funds, a Tennessee graduate student assembled materials on world agriculture and economic development for classroom use.

The 211(d) professor in Tennessee has helped to arrange special between-term study and travel programs. These have permitted the study of development programs in Tennessee such as TVA, that are relevant to overseas development.

The net effects of the 211(d) program on teaching are: (a) direct participation in teaching courses with applicability to development, (b) stimulus to increased university efforts in the teaching of subjects significant to international agriculture development, (c) expansion in supply of relevant teaching materials, (d) much more effective teaching as a result of the opportunity for 211(d) students to study in a developing country, (e) increased numbers of graduate students preparing for careers in international agriculture. At the end of the second year there were 15 graduate students enrolled in the six universities under the 211(d) program.

Development of Research Competence

The 211(d) grant is strengthening the capacity of the universities to do effective research on problems of world agriculture. Missouri and Pennsylvania report that work of their students and professors at Indian Universities have resulted in sharpened perception of the problems of developing a research experiment at a foreign institution. Skill has

also been gained in planning students research projects with Indian colleagues. These practical exercises in doing work overseas will feed back to the home campus in better teaching and better training for both American and foreign students.

The 211(d) program has also stimulated an interest in searching for examples of U.S. experience that are relevant to foreign economic or agricultural development. As a result, some American problems will be studied in ways that will benefit world development and U.S. development as well. For example, Tennessee is developing studies with the Oak Ridge Laboratory on the problems of Agro-industrial complexes, and does work with TVA on studies of migration and rural-urban adjustment viewed as world wide problems. Pennsylvania is planning to expand work on soybeans and sorghums - relatively minor crops in Pennsylvania but highly important in India. Some of the 211(d) students will have theses on these crops. In Missouri the 211(d) project has instigated research on green gram, and 321 cultivars will be grown at Columbia, Missouri in 1970. The research assistant is supported by 211(d) funds, but other expenses of this experiment are bourne by the Missouri Experiment Station. This will be very useful at Crissa, but may also have direct value in Missouri. A large Missouri food processor that has been using imported gram in processed food has expressed interest in the program.

The inititation of internationally oriented research activities under the 211(d) projects is generating interest of the other scientists at these institutions. As a result, cooperative efforts are developing. For example, a USDA plant pathologist at the University of Illinois works with the 211(d) professor on studies of certain soybean diseases and their control. U.S. and Indian graduate students at Illinois work together on research projects under the supervision of the 211(d) professor. Ohio State reports that experience of U.S. graduate students and the 211(d) professor in preparing joint publications with Indian authors will enhance the international reputation of Ohio State and its research workers. As a result, the institution will be more able to attract top-notch professional workers and graduate students.

Strengthening the competence of the departments in research will contribute directly to the strength of their teaching programs since these two activities are closely linked at Land Grant Institutions.

Strengthening the Capacity for Consultation and Service Work

Strong departments with staff that is well-known in professional circles are the ones that are doing outstanding service work and consulting. The 211(d) program is enhancing the skill of the professional staff involved because of the opportunities to visit foreign research centers and to participate with Indian institutions in joint planning for graduate study by the 211(d) students.

A wide variety of consulting and service activities are reported by the individual professors. . At Illinois, and at Tennessee, the 211(d) professors are professional consultants to the Peace Corps. The Illinois professor meets with his colleagues from several departments to consult on problems of soybeans through the Program for International Research improvement and Development of Soybeans (PIRIDS). This program will eventually involve 12 countrées.

The Missouri 211(d) professor in the past year has consulted with scientists at the Orissa University of Agriculture and Technology on evaluation of wheats and identification of objectives of a wheat breeding program. He gave a seminar to the Plant Breeding Department at J. Nehru Agricultural University, participated in a crop plant evaluation symposium at the Indian Agricultural Research Institute, participated in an International Barley Genetics Symposium in Pullman, Washington, and lectured at several U.S. colleges and universities.

At Kansas State University the program has enabled the Department of Grain Science and Industry to expand its already well-established competence in service and consultation.

The 211(d) Professor alone, or with colleagues, has prepared 10 papers on articles dealing with various aspects of grain science of world-wide applicability. He has served on national and international committees and has been made honorary life president of the International Association for Cereal Chemistry.

Aside from his trip to India, travel of the 211(d) professor has been paid from funds other than 211(d). One tenth of his time is also supported by the University.

The 211(d) professor in each of the universities has been called upon to advise and participate in Campus committees on curriculum planning for international studies and similar activities, and to counsel with students on training for internationnal careers. Some of the professors serve on the international committees of the Professional Societies.

In sum, the 211(d) professors possess unusual skills and knowledge that result in growing demand for their advice at home and abroad, and this active consulting role enhances the service activities of the departments.

Involvement of the University in International Agriculture

The Land Grant Universities have been expanding their world view. This process would have gone on without the 211(d) input, but less rapidly. Some of the institutions have a long history of international work and collaboration. Kansas State, for example, with the only Department of Grain Science and Industry in the world has for many years attracted students to Manhattan from foreign countries, and its faculty have been active in international consulting roles. Because of the importance of wheat exports to the economy of the state, and the recognition

that wheat is a world crop, the state has become accustom. to the need for foreign exchanges in research and education with respect to grain science. About 60 percent of the graduate students in the Department of Grain Science and Industry are from foreign countries.

In somewhat the same way, the University of Illinois is gaining increasing recognition by citizens of the state of the world significance of soybeans and the validity of the idea that the University of Illinois should be able to cmmprehend phenomena related to soybeans, wherever they may be located. On a broader plane, in all states there is growing appreciation of the world food problem and the need for state institutions to understand the nature of it and to contribute to its solution.

The reports of the various state 211(d) projects describe tangible progress in university involvement.

Illinois notes that the 211(d) project involves use of about $25,000 in facilities furnished by the university, compared with $15,000 in the first year. A Crop Evaluation Laboratory is being established in the Agronomy Department with a world wide scope. An inter-departmental project -- "Strategies for Agricultural Development" is being worked up. There is an agronomy project -- "Collection, Evaluation and Improvement of Tropical Root Crops." The university has acquired and is developing a property in Jamaica which will be used for international training, teaching and research. Illinois is offering a new course in World Animal Agriculture, and two U.S. graduate students in Animal Science are scheduled to do thesis research in Asia. At Illinois, American students may now secure supervision of thesis research in India in the Departments of Agronomy, Agricultural Economics, Animal Science, Dairy Science, and Agricultural Engineering. Illinois has one of the largest collections of thrips in the world, with a world-wide identification service available. The growing importance of international work at Illinois is indicated by recent administrative action which made the Director of International Agricultural Programs an Associate Dean.

At Pennsylvania State, the Coordinator of International Programs is developing a Rural Transformation Program in the College of Agriculture.

Ohio State University has new international courses in agronomy and others are being proposed. A study-year abroad program for agricultural undergraduates was started in 1969. There are now four students enrolled, three in India, and one in Brazil, and some university financial assistance is being made available for this program. The University has established a policy that other departments should have at least one international professor on its staff.

Several of the universities report that increasing numbers of foreign graduate students are receiving financial support from regular university funds, and indication of growing recognition of university interest in international education.

The four campuses of the University of Missouri each have an international study center, and the College of Agriculture at Columbia has established the position of Director of International Programs.

Several institutions report that library collections of international agricultural materials are being significantly strengthened with regular University funds. The OSU library has added about 100 new publications on international agronomy, and Tennessee about 200 copies of materials dealing with South India. The library of the University of Missouri has added many books on plant breeding, tropical agriculture, and world food production.

The University of Tennessee reports continued "modest but healthy" growth of attention to international students who number about 500, and a growth of overseas study and service opportunities. An Office of International Education was established two years ago and the Office of International Student Affairs was strengthened during the year. An Asian Studies Program has been approved in the College of Liberal Arts. Summer work programs in Latin America have been made available to students. The University has a new periodical: "Focus International."

The 211(d) projects do not stand alone at these universities. With their five-year forward funding and the flexibility made possible by terms o of the grant, the projects are stimulating and accelerating the development of general international competence in agriculture at these institutions. The adequate growth of the international dimension will, however, require a number of years, and some continued external support.

UNIVERSITY OF ILLINOIS

COLLEGE OF AGRICULTURE

DEPARTMENT OF PLANT PATHOLOGY

ANNUAL TECHNICAL REPORT OF 211(d) PROJECT

1969 - 1970

TECHNICAL REPORT # 2

211(d) International Porgram
University of Illinois
May 1970

I. SUMMARY

The AID 211(d) Program in plant pathology at the University of Illinois is approaching the end of its second year of activity, having officially begun in June 1968. This is the second Technical Report concerning the development within the University of Illinois specialized competency in the identification and cause and control of diseases of agronomic plants of India, and establishment of the area of specialization as a legitimate and continuing function of the University. Progress reported in Technical Report #1 will not be reiterated except where necessary.

Plans for the remaining three years of the 211(d) Program are now complete. Emphasis must be placed on graduate student training for competence in overseas work in plant protection, particularly in plant pathology. The limited funds of the grant do not allow for development or expansion of other areas. It is felt that this is the area of international involvement that requires support at this time.

Approximately $40,000 of 211(d) funds were expended during the year ending May 1970 in support of the Program. Over half of this amount ($25,223) was for salaries, stipends, and fringe benefits. The remainder ($14,682) was used to support the activities of the 211(d) Professor, and to provide moveable equipment and expendable items for the research program. Over $25,750 was provided in support of 211(d) activities from funds other than 211(d) for direct support of the Porgram during the year. Cooperation at all levels with the 211(d) Program both at the University of Illinois and in India has made the success of the Program possible.

Activities generated by the 211(d) Program have met the objectives of the grant in both obvious and subtle ways.

Certainly through contacts with the 211(d) Professor and the graduate students involved in the Program, many faculty, students, nonacademic and nonuniversity personnel have become aware of the significance of the U.S. university in international agriculture. This has been accomplished through both formal classroom presentations and informal discussions. Announcements concerning these activities in newspapers and academic newsletters also make a contribution.

The Program has certainly increased the competence of the 211(d) Professor in international agriculture. The teaching of advanced courses and graduate student training programs under his direction is not only educating college students about international agriculture, but is assisting in acting as a catalyst in the expansion of interest and training of students in this area.

The graduate training program is increasing the pool of manpower with international experience and understanding of the problems of developing nations.

The Program is so arranged at this time that the U.S. graduate students work with graduate students from India in the same laboratory and on parallel research problems. The U.S. students will continue their association with these same Indian students when they travel to India to continue their studies. This certainly provides the basis for a strong training program.

The 211(d) Professor was asked to serve in three international programs this past year: (1) development of a tropical studies center in Jamaica; (2) the Program for International Research, Improvement, and Development of Soybeans; and (3) a research project on tropical root crops.

Other activities of the 211(d) Professor are presented.

II. LISTING OF GRANT OBJECTIVES

1. To increase the capabilities of the University of Illinois in the area of international agriculture, particularly in the area of plant protection and plant pathology, and to generate increased public awareness of the significance of the international dimension of university education and research.

2. To increase the pool of manpower with understanding of problems of developing nations.

3. To assist in the development of faculties with competencies in international agriculture, particularly plant pathology, at the University of Illinois and act as a catalyst in the expansion of interest and training for careers in international agriculture.

4. To educate college students for careers in foreign agriculture.

5. To more effectively use university personnel with foreign experience in the development and training of domestic and foreign students for professional positions in international agriculture.

6. To develop a corps of experts in the various phases of agricultural development which may contribute to the evaluation and solution of problems in which there is national interest.

III. MAJOR ACCOMPLISHMENTS DURING THE YEAR

The 211(d) Program at the University of Illinois made remarkable progress in the past year. The Program, because of difficulties in staffing, got off to a slow start the first year, but now appears to be an overwhelming success, which wholly justifies the confidence of AID and CUSURDI in the entire program. The broad objectives of the grant are being met as the planning for the remaining three years of the Program are nearing completion. It should be emphasized that the progress reported here for 1969-70 in the 211(d) Program was possible because of: (1) substantial financial support from the University of Illinois and the College of Agriculture; and (2) the total cooperation on the part of University of Illinois personnel at all levels, as well as many institutions in India.

A. Development of Teaching Competence. A graduate course, open to undergraduates, concerned with the epiphytology of plant diseases was taught by the professor. The course was revised and its scope enlarged to include diseases of international importance on a variety of crops. The University of Illinois provided over $400 for teaching aids and materials in direct support of the course.

The 211(d) Professor presented two special lectures during the Spring semester (1970) in a course concerned with the control of plant diseases. One lecture was concerned with the use of systemic fungicides for plant disease control. The second lecture was concerned with the need for international cooperation in planning plant disease, as well as other pest control programs. The 211(d) Professor also provided educational materials for use in the course.

In these two courses, it was estimated that over 50 students, both graduate and undergraduate, were made aware of the international aspects of plant diseases and plant disease control.

Plans for the new interdisciplinary (plant pathology, horticulture, and economic entomology) courses on international food crops were completed this year. University approval is expected this summer (1970). It will be taught during the Spring semester in 1971. It will cover the culture of international food crops, along with disease and insect problems and their control. Lectures on the need for increased world food production are anticipated. The three professors responsible for the lectures in this course have had overseas experience in several developing nations, including India, Africa, Latin America, and Indonesia.

A number of seminars were given this past year both at overseas institutions, as well as at the University of Illinois and Eastern Illinois University. An invitational seminar was given at Eastern Illinois University of the 211(d) Program and its role in international agriculture. Over 40 undergraduate and graduate students attended the lecture, as well as many faculty and staff members.

B. Development of Research Competence. A very active research and graduate training program has developed since the completion of the research laboratory in May 1969 (see Technical Report #1). A number of students were attracted to the program. It has become necessary to turn away qualified, dedicated young people who are sincerely interested in international work in agriculture, particularly plant pathology. This fact certainly indicates that strong consideration should be given to both increasing the support of the present program, as well as continuing support after the termination of the original grant in June 1973.

The research program involves laboratory, greenhouse, and field work (facilities provided by the University). All members of the research group work together and assist one another in their respective research efforts. The success of this relationship can be partially judged by the fact that at least four research papers from the program will be published in 1970.

Dr. Lynn Gray, Plant Pathologist with the U.S. Department of Agriculture, and the 211(d) Professor work together in the research program studying certain diseases of soybeans and their control. The graduate students select problems in the same general area. Soybean is being introduced as a possible food crop in India through the University of Illinois' contract team at Uttar Pradesh Agricultural University (U.P.A.U.) and the J. Nehru Krishi Vishwa Vidyalaya (J.N.K.V.V.) Both researchers advise the graduate students. It would be difficult to give a dollar value to the services of Dr. Gray and the contributions he makes to the Program.

There are now five graduate students in the 211(d) Program committe to training for overseas work. A schedule for their formal course work and research training has been worked out. The tentative schedule for each student's advanced training in India was formulated. There are two U.S. students and two students from India now actively engaged in training under the direction of the 211(d) Professor. Two additional U.S. students will begin their training in June 1970. A fifth U.S. student, R.A. Sikora will receive training in India under 211(d) sponsor ship beginning in September, 1970.

The laboratory program is so arranged that the two U.S. students now in the Program, W.A. Meyer (supported by the University), and R.W. Schneider, work closely with two Indian graduate students from U.P.A.U. The U.S. students share the same office space with one of the Indian students, P.N. Thapliyal, an A.I.D. participant. The other Indian student, P.D. Kharbanda, is supported by departmental funds ($3,500). The two U.S. students have the unique opportunity to work closely and continuously with these two students from India. Either or both the U.S. students will go to U.P.A.U. for their advanced training. An excellent rapport and understanding has developed between these men, which will be continued when they are all in India. The two U.S. students joining the Program in June will have the same opportunity to work with the Indian students before the latter return to India.

Mr. Sikora does not work in the same laboratory, but he is professionally acquainted with the work Messrs. Kharbanda and Thapliyal are doing.

Plans for advanced training in India of graduate students for the remaining three years of the 211(d) Program are completed. There are five students in the Program:

Richard A. Sikora - Mr. Sikora will complete all the requirements for the Ph.D. in plant pathology with an emphasis in nematology by August 1970. He is now supported on departmental funds. Negotiations are complete for his appointment as a special student for one year beginning September 1970 at Uttar Pradesh Agricultural University, Pantnagar.

William A. Meyer - Mr. Meyer is now supported by other than 211(d) funds. He will complete the requirements for the Ph.D. in plant pathology through the preliminary examination during the Fall of 1970. Negotiations are underway to arrange for him to spend a year beginning in January 1971 at J. Nehru Krishi Vishwa Vidyalaya, Jabalpur, under sponsorship of the 211(d) Program.

Raymond W. Schneider - Mr. Schneider is supported by both 211(d) and the College of Agriculture international funds. He will receive his M.S. in plant pathology in January 1971 and proceed toward meeting the requirements of the Ph.D. degree. He is scheduled to receive his year's advanced training in India beginning in February 1972.

James F. Nicholson - Mr. Nicholson will begin his work on the Ph.D. in June 1970 with support from both 211(d) and the College of Agriculture international funds. His advanced training in India is scheduled for one year beginning in February 1972.

Bruce L. Kirkpatrick - Mr. Kirkpatrick will begin his work on the M.S. degree in June 1970 under the 211(d) Program. He will complete the course requirements for the M.S. in January 1972 and take six months advanced training in India beginning in February 1972.

C. Development of competence for Consultations and Service. The 211(d) funds have provided the unique opportunity for the University of Illinois to have a Professor with a strong interest in international agriculture to devote full time to the development of a program of teaching, research, and graduate student training with international dimensions as related to India.

In order to be knowledgeable in all aspects of international agriculture, and to carry out the format of the 211(d) graduate training program, it is mandatory that the 211(d) Professor make at least one trip to India each year.

Professor Sinclair made a return visit to India during December 1969 and January 1970 at a cost of approximately $2,900. He attended the annual meeting of the Indian Phytopathological Society and gave an invitational research paper at the Indian Science Congress, both meetings being held consecutively at the Indian Institute of Technology at Kharagpur. This gave him the opportunity to meet with and discuss problems of mutual interest with a number of Indian scientists. Other Indian institutions visited were: J. Nehru Agricultural University, Jabalpur; Uttar Pradesh Agricultural University, Pantnagar; and the Indian Agricultural Research Institute, New Delhi. Informal meetings were held with members of the Indian Council of Agricultural Research. There was a strong and continuing interest in the 211(d) Program by many of the members of the various Indian institutions.

A graduate student, Richard A. Sikora, accompanied the 211(d) professor on the trip to India. Mr. Sikora's expenses ($300), while in India, were paid from departmental international funds. The remainder of the expenses were paid by Mr. Sikora. While in India, the 211(d) Professor gave a series of seminars on systemic fungicides and Mr. Sikora gave seminars on the soybean cyst nematode.

Mr. Sikora will be returning to U.P.A.U. for a year as a special student under the 211(d) Program. During this visit, preparation were made and agreements finalized for Mr. Sikora's activities between September 1970 and August 1971.

Other universities and plant pathology research and teaching centers were visited on this trip. These were:

Hawaii - The East-West Center; The University of Hawaii; The Hawaiian Sugar Planters' Association; and the Pineapple Research Institute.

Philippines - International Rice Research Institute at Los Banos.

Nepal - Department of Agricultural Education and Research at Katmandu.

Iran - USDA Regional Pulse Improvement Project; University of Tehran; and the Plant Pests and Diseases Institute.

Lebanon - American University at Beirut; and the Agricultural Research and Educational Center at Baalbek.

Sierra Leone - Njala University College at Njala.

Further competence of the 211(d) Professor is reflected in his involvement in three international programs of the University of Illinois and the College of Agriculture. These are:

1. Development Plans for the University of Illinois' Jamaician Property.

The University of Illinois Foundation acquired 750 acres of land at St. Margaret's Bay in Jamaica, and proposes the establishment of a teaching and research center on this property. One of the purposes of th center is to provide a training ground for graduate students and faculty members who are anticipating working overseas. The 211(d) Professor was very active this past year in developing plans for this property. He assisted the ad hoc committee of the Graduate College to state the interest of the academic community in the development of the land. More recently he has been asked to serve on a three-man ad hoc committee for the U.I. Foundation to assist them in seeking support funds for the property and then to serve as an internal advisory group until such time as the permanent advisory group is named.

2. Collaborator in Two College of Agriculture International Programs.

Professor Sinclair was asked to serve indefinitely as the collaborating plant pathologist in two major international programs in the College of Agriculture.

The first is with the Program for International Research, Improvement, and Development of Soybeans (PIRIDS). This is an interdisciplinary effort involving most departments in the College of Agriculture. It will eventually operate in at least 12 foreign countries. The soybean Coordinated Research Project in India is part of the PIRIDS Program.

The second is with the recently developed project on Tropical Root Crops. The program is coordinated by the Horticulture Department. Prof. Sinclair has traveled to Jamaica, Trindad, and Puerto Rico to confer with various members of the University of the West Indies and other institutions on developing a coordinated study on tropical root crops. It is anticipated that the University's Jamaican property will be used for research on this important food crop of the tropics. The trip to the West Indies was supported by College of Agriculture international funds.

Competence in international agriculture was further developed by the 211(d) Professor in other areas:

1. He was named a "Career Consultant" in Agriculture/Plant Pathology for the Peace Crops. He has answered direct mail inquires, as well as holding personal conferences with Peace Corps trainees.

2. He participated in "Earth Day" observances by giving a talk on air pollution on crop plants. It was emphasized that air pollution damage to plants is an international problem.

3. The 211(d) Professor was instrumental in having Dr. Y.L. Nene, Head of the Department of Plant Pathology, Uttar Pradesh Agricultural University, come to the UI campus to visit with the 211(d) graduate students, give a seminar to graduate students and faculty, and consult with various professionals on pathology problems in India.

4. He recommended that Dr. Eugene Terry, AID Participant in plant pathology at UI, visit the International Rice Research Institute on his return to Sierra Leone. Contacts with pathologists at IRRI were established during the recent trip to India. While at IRRI and then during the visit to Njala University, it was realized that Dr. Terry would gain much by visiting the highly respected research institute.

5. He has continued many of the activities initiated last year such as: (a) reviewing books with aspects of international plant pathology for the APS Newsletter; (b) participation in the Southern Regional Research Project (S-72) on soybean seed quality; (c) collaborating with Indian plant pathologists on planning research work, graduate student training, course offerings, etc.; (d)cooperating with other departments of the University of Illinois; and (e) cooperating with the 211(d) professors and other members of the Council of U.S. Universities for the Rural Development in India.

6. The 211(d) Professor has brought the 211(d) training program to the attention of potential employers, such as: Ford Foundation, Rockefeller Foundation, various industrial firms involved in international agriculture, UN-FAO, U.S.D.A., and other similar agencies. This work will continue so that employment for the 211(d) students may be assured after they finish their training.

D. Involvement of Other Univeristy Resources. The meager funds provided by the original 211(d) grant are not adequate to carry out the plans and scope of the present program. Many units of the University of Illinois provided either indirect or direct support to the program this past year.

Administrative services and advice provided by the: (1) Office of International Programs and Studies; (2) Office of Overseas Projects; (3) Office of International Agricultural Programs; and (4) Department of Plant Pathology.

All services for the operation of the teaching classroom and laboratories; the research laboratiories, greenhouses and growth chambers are provided by the University.

More specific support came from:

The Department of Plant Pathology by providing:

1. $1,000 for general support of the international program.
2. $1,300 for a 1/4 time secretary.
3. $800 for office supplies for the year.
4. $400 for teaching aids and supplies.

The College of Agriculture by providing:

1. $4,500 through regional research funds.
2. $200 for renting approximately 1/2 acre of land for experimental field plots.
3. $7,000 for support of one U. S. and one Indian graduate student in the Program.

The Office of International Agricultural Program by providing:

1. $8,350 for a growth chamber.
2. $1,000 in support of graduate training.
3. $100 for consultant visit of Y. L. Nene.

AID by providing $1,200 in support of the AID participant in the Program (P. N. Thapliayl).

Thus, over $25,850 was provided from funds other than 211(d) for direct support of the 211(d) Program in the fiscal year 1969-70. The first year (1968-1969) over $15,000 was provided.

E. International Programs of the College of Agriculture.

A relatively high and increasing level of activity in international programs continued throughout 1969-70. A principal objective of the Office of International Agricultural Programs is to strengthen the international programs of the College of Agriculture and its departments. One technique being employed is to organize interdisciplinary projects, each under a supervisor or director. One of these projects, the Program for International Research, Improvement and Development of Soybeans (PIRIDS) has received campus-wide support and worldwide expressions of interest and enthusiasm. Work was initiated in July 1969 with support of a modest grant from Rockefeller Foundation. Additional financing was provided through the Office of International Programs. Major additional support is being actively sought. This is a multi-disciplinary program with potentially heavy involvement of scientists from Agronomy, Agricultural Economics, Plant Pathology, Food Science, and Entomology. Soybeans offer a very real potential for a major contribution to solution of the world nutrition problem, particularly protein deficiency. Recently the Department of Food Science developed simple processing of soybeans for human consumption. Major support for PIRIDS is a high priority itme in our future programs.

The project, Strategies for Agricultural Development, has progressed slowly since its inception last September. Two faculty members of the Department of Agronomy developed a proposal, as a result of a short assignment in India, for a streamlined soil survey based on soil productivity. If accomplished, this could be a major contribution to development planning in India. A project has been implemented to study the economics of rice production in West Africa. Several countries in the area all plan to increase rice production so they can export to their neighbors.

The work of the Crop Evolution Laboratory in the Department of Agronomy continues with an expansion in a new dimension. Professor de Wet is taking several graduate students with him on a plant exploration trip to Mexico.

The Jamaica property has been a major interest and concern of the College of Agriculture. Numerous staff members have been involved in and made trips to Jamaica to study its potential, problems of development, and possible use as a tropical area for international training, teaching, and research. Two plant pathology faculty members recently surveyed some of the soils to determine the presence of nematodes, a major soil pest affecting crops. This was under a recently established project, "Collection, Evaluation, and Improvement of Tropical Root Crops." A graduate student in agricultural economics is presently studying vegetable and fruit marketing problems and systems in Jamaica.

The 211(d) project in plant pathology continues at a high level of activity including substantial graduate student involvement. Plans are being finalized to send two U. S. graduate students to India to do doctoral research in the near future.

Agricultural entomologists have a very ambitious program with a substantial overseas involvement. A graduate student is presently doing his doctoral research in India. As a result of cooperative programs abroad, an international collection of thousands of specimens of Thysanoptera (thrips), one of the largest collections in the world is located at the University of Illinois. Involvement in the Coordinated Research Project (soybeans) has resulted in a collection of authentic insect pests of soybeans from all parts of the world. An international identification service based on these specimens is offered to anyone concerned. The world literature on soybean insect pests is being abstracted for use in a data retrieval system. More than 1,500 entries have been processed to date. The facility is being made available to entomologists and agriculturists generally.

The World Animal Agricultural program continues with one student doing doctoral research in dairy science in Thailand and another from the Department of Animal Science planning to go to Indonesia in the near future. Enrollment in the new course, World Animal Agriculture, has been very encouraging.

The Department of Agricultural Economics continues to provide assistance in the development of agricultural economics at the Uttar Pradesh Agricultural University in India. The program has leveled off at one full-time staff member plus one short-term assignment in India annually. The second U.S. graduate student is presently in India doing doctoral research under this program. Several faculty members served in India under this program during the past year.

Dr. W.N. Thompson served on a study team to evaluate the maturity of the Punjab Agricultural University in India. This is a follow-up of the USAID institution-building activity in which the College of Agriculture, particularly the Department of Agricultural Economics, has been involved.

University of Illinois/USAID contract involvement continued at a high level and full staffing during the year. There has been a breakthrough in U.S. graduate student doctoral research in the overseas programs generally. Two such positions were provided in each of the India contracts for the current fiscal year.

The Njala University College contract, at the request of USAID, was changed to a regional contract with a plan for a high level of staffing. Long-term staff positions for each India contract were reduced from eight to six this spring.

Involvement in the Indonesia (MUCIA) contract is imminent. One faculty member is committed to a short-term assignment; another will probably be committed soon. There is also a good probability that we will fill a two-year position. This is the first university direct participation since the preliminary work was carried out.

At the request of USAID, a team visited Nepal to study prospects for an institution-building contract. M.D. Thorne, Head, Department of Agronomy, served as chairman of the team. Other members of the team were Jacob Stern, Associate Professor of Vocational and Technical Education, and M.B. Russell and R.R. Renne, the Chiefs of Party of our two India contracts. A report has been submitted to USAID.

The duties and responsibilities of the Office of International Agricultural Programs are outlined in a statement, Functions of the Office of International Agricultural Programs, prepared by the College of Agriculture Policy Committee on International Programs. The statement was accepted and distributed to all faculty members. The appointment of W.D. Buddemeier as Director of International Agricultural Programs and Associate Dean, and E.R. Leng as Assistant Director of International Agricultural Programs completes the presently authorized staffing of the office. Additional staffing would be desirable to provide better technical coverage and continuity.

Faculty interest in international activities continued to increase during the past year. Student involvement in the programs has attained a new high. It is essential that additional funding be found to maintain the rate of growth experienced the past few years.

IV. EXPENDITURES

Expenditures from the 211(d) grant funds for the University of Illinois are presented below. No stipends for graduate students were used during the first year, but $2,641 was used this past year. Travel expenses shown are for U. S. travel, and for the consultant visit of Dr. Moore in 1968-69 only (see footnote below). Equipment monies were used to supply the new laboratory with research equipment (see footnote below).

Budget Summary

Salaries	15,654	22,582	--	--	--	38,236
Stipends	--	2,641	--	--	--	2,641
Travel	1,314[a]	926[a]	-	--	--	2,240[a]
Equipment and Supplies	8,789	13,756[b]	--	--	--	22,545
Total	25,757	39,905				65,662

[a]This travel figure does not include the cost of international transportation of Professor Sinclair, estimated to be $3,376.60 for two years. Upon receipt of an official advice of charges from the Grant Office, this amount will be included as an expense.

[b]All major items (over $100) were purchased in 1969-70 were from U.S. manufacturers. The various items listed below were purchased for the research laboratory to be used in experiments being conducted by the 211(d) students the 211(d) Professor, and the graduate students under the direction of the 211(d) Professor.

Item	Cost	Manufacturer
Balance	$ 770	Mettler Mfg. Co.
Culture cabinets (2), low temperature	1,428	Sub-zero Freezer Co.
Transfer hood	375	Air Control, Inc.
Microscopes (2), stereo research and dissecting with accessories	2,560	American Optical
Calculator	1,755	S.C.M. Corp.
Flash evaporator	345	Buchler Instruments
TOTAL	$7,233	

A single international trip was made under the sponsorship of the 211(d) Program from December 22, 1969, through February 8, 1970.

The administrators, members of the research and teaching staff, and/or facilities of the following institutions were visted at an approximate cost of $2,900. Particular attention was given to facilities and programs involved in research and teaching of plant pathology.

At least one, and in many cases, two seminars were given at each institution visited. Two seminars were prepared on systemic fungicides, and a third seminar was concerned with studies on G. candidum. Mr. Richard Sikora, a graduate student from the department, accompanied me on a portion of the trip and, at certain locations, gave a seminar on the soybean cyst nematode.

Hawaii (Oahu):

A. University of Hawaii - Honolulu

1. Department of Plant Pathology
2. Department of Vegetable Crops
3. East-West Center

B. Pineapple Research Institute - Wahiawa

C. Hawaiian Sugar Planter's Association - Honolulu

The Philippines:

International Rice Research Institute - Los Banos

India

A. Indian Council Agriculture Research - New Delhi

B. Indian Agricultural Research Institute - New Delhi

C. Ford Foundation - New Delhi

D. Rockefeller Foundation - New Delhi

E. Uttar Pradesh Agricultural College - Pantnagar

F. J. Nehru Krishi Vishwa Vidyalaya - Jabalpur

G. Indian Institute of Technology - Kharagpur

Nepal:

A. Department of Agricultural Education and Research - Katmandu

1. Plant Pathology Section
2. Entomology Section
3. Agronomy Section

B. U. S. Agency for International Development - Katmandu

Iran.

A. Regional Pulse Improvement Project (USDA) - Tehran

B. University of Tehran - Tehran

1. Faculty of Sciences
2. College of Agriculture
3. Karaj Agricultural College

C. Plant Pests and Diseases Institute - Tehran

Lebanon:

A. American University at Beirut

B. Agricultural Research and Educational Center - Baalbek

Sierra Leone:

Njala University College - Njala

The purposes for the trip were several:

1. To make arrangements for the first 211(d)-sponsored student to study and work at one of the USAID/UI contract universities (U.P.A.U. or J.N.K.V.V.).

2. To further assess the development of plant pathology at U.P.A.U., J.N.K.V.V., and I.A.R.I.

3. To strengthen the cooperative relationships between plant pathologists and other agriculture personnel at I.A.R.I., U.P.A.U., and J.N.K.V.V. A conference was arranged between the 211(d) Professor and Dr. Joshi. Dr. Joshi will receive his Ph.D. from the UI after submitting his dissertation on his research completed at I.A.R.I. in India.

4. To attend and participate in the annual meetings of both the Indian Phytopathological Society and the Indian Science Congress held at the Indian Institute of Technology, Kharagpur.

5. To assess the development of plant pathology and other agricultural sciences in the Department of Agricultural Education and Research at Katmandu, Nepal, and Njala University College, Sierra Leone. The University of Illinois has a USAID contract team at Njala and were asked to provide technical advice at Katmandu.

6. To gather information and materials for teaching the new course on international food crops, diseases and insects.

7. To make personal contact with colleagues and plant pathologists at various institutions to increase the competence of the 211(d) Professor in international agriculture.

The purposes of the trip were accomplished. A detailed report was filed with the proper administrators of the University of Illinois.

It is interesting to note the following quotation from an unsolicited letter written by Dr. R. S. Singh (Plant Pathologist at U.P.A.U.) on 16 May, 1970:

"Thank you very much for sending us so many things and informations after your last visit to this place. These are really useful contributions from your side to this Department and are being appreciated not only by me but all concerned. As a matter of fact, since your last visit some of my research assistants got so much interested in systemic fungicides that they immediately started working with Benlate, Vitzvax, Plantvax, RH 893m and RH 124 for seed-treat ment of maize, soybean, and wheat. Some very interesting results have been obtained. They found the same (effect) of Benlate in soybean as was told by you from Thapliyal's work. Data have been obtained on seed-viability after treatment, persistence of the fungi toxicity in the plants, etc. We remember your encouragement and a real approach to international plant pathology."

V. WORK PLAN AND BUDGET FOR 1970-71

The work plan for the remaining three years of the grant were presented in previous sections. The teaching, research, and graduate training programs, as well as the development of various competences, will continue. A trip to India is planned for December 1970-January 1971 to assess the program of the first 211(d) sponsored student at U.P.A.U. and place the second student at J.N.K.V.V. It is planned that the 211(d) Professor will participate in the 2nd International Plant Pathology Congress sponsored by I.C.A.R., I.A.R.I., and other Indian institutions. It is to be held in New Delhi during this period.

The experience gained from administering the 211(d) grant for approximately two years shows that the original allocated funds will not be sufficient to carry out all the original purposes of the grant for the remaining three years. At best, the original funding was considered minimal. At least an additional $100,000 would be required in the next three years. There was some indication that the USAID Mission in India would provide some Rupee support to the program. It is now quite clear that every item of expense for the program will have to come out of the dollar budget of the grant, since it has been verified that this is not considered a USAID Mission Program and that the USAID Mission in India has no responsibility for the program or any means to offer Rupee support.

It was the hope of AID-Washington that 211(d) funds would be used to "seed" other campus projects related to international agriculture. It now appears that less than minimal amount of this activity can be realized because all existing funds must be used solely for support of student training. At present there are five students involved in the UI 211(d) Program, each committed to spend either six months or a year in India.

Funds for the support of ancilliary programs, such as visiting professorships, seminars, conferences, meetings with international significance, undergraduate programs, etc. are needed. Without additional funding none of these efforts can be realized.

Unless additional funding is possible, the expenditure of 211(d) funds for the next three years will go for salaries, stipends, and overseas travel.

A summary of the original University 211(d) budget was presented earlier.

If additional funding is not forthcoming, then the revised budget for 1970-1973 will be as follows:

Category	Original Budget	1968-69	1969-70	1970-71	1971-72	1972-73	Totals
Salaries	115,020	15,654	22,582	23,932	25,368	26,890	114,426
Stipends	41,400	--	2,641	9,750	16,950	8,150	37,491
Travel	13,000	1,314	2,989	5,195	7,645	6,895	24,038
Equipment and Supplies	30,580	8,789	13,756	500	500	500	24,045
Totals	200,000	25,757	41,968	39,377	50,463	42,435	200,000

KANSAS STATE UNIVERSITY

COLLEGE OF AGRICULTURE

DEPARTMENT OF GRAIN SCIENCE AND INDUSTRY

ANNUAL TECHNICAL REPORT OF 211(d) PROJECT

May 31, 1969 to June 15, 1970

KANSAS STATE UNIVERSITY

DEPARTMENT OF GRAIN SCIENCE AND INDUSTRY

Manhattan, Kansas

SECOND ANNUAL REPORT AID 211(d) GRANT TO DEVELOP SPECIALIZED COMPETENCIES ASSOCIATED WITH GRAIN UTILIZATION IN INDIA - 1969-70

June 15, 1970

I. SUMMARY

The 211(d) India program has progressed this past year exactly as planned previously. Mr. Merrick Lockwood and Mr. Patrick Finney, the two graduate students having fellowships under this program, have completed all the course requirements for the Ph.D. degree and are preparing for their preliminary examinations.

There has been no need for either of the two graduate students or the 211(d) professors to travel to India or make other trips in connection with the program this year, since attention to campus assignments could best serve the needs of the program. Budget expenditures this past year were, therefore, confined almost entirely to salaries with only minor expenditures for such items as books and supplies.

The objectives of the 211(d) India program have been adhered to and program development has progressed as anticipated. All the preliminary work associated with the students being accepted at the Central Food Technological Research Institute at Mysore, India, has been accomplished. Preliminary arrangements are being made for Professor Bains, of the Central Food Research Institute, to come to Kansas State University for consultation with the staff and for the presentation of seminars.

The 211(d) program has stimulated consideration of the importance of international development programs among both graduate and undergraduate students on the campus. Also, the 211(d) program has resulted in more active collaborative endeavors with the university's South Asia Center, the International Activities office, and the programs of the International Agricultural office. There have been many interchanges between these various offices involving mutual assistance and program participation, seminars, visitations, and consultations. Also, the 211(d) program has brought closer cooperation with staff personnel who have assignments in various locations throughout the world, such as Central and South America, Africa, and Asia. There is considerable anticipation among both students and staff with regard to how research progress will be accomplished by the students who will be pursuing their thesis research in India.

Budget expenditures have been less this past year than anticipated, primarily because the two graduate students on fellowships have, of necessity had to confine their work largely to completing their course requirements for the Ph.D. degree: consequently, there has been but small expenditure for supplies and no major travel expenditures. However, it is anticipated that in the next year there will be a decided increase in expense cost for this program because both students and the major professor will have travel expenses to India and there will be major expenditures for necessary equipment and supplies.

If there appears to be sufficient funds, consideration will be given to adding another graduate student to the program, probably to complete the requirements for the M.S. degree by pursuing as much of the work as possible in India.

II. GRANT OBJECTIVES

The basic objectives, as stated in the contract, are as follows:

The basic objectives are to train graduate students in food grain utilization in India and other developing countries and to further develop the competency of Kansas State University in these areas. The University considers international activities of this nature a legitimate concern and function. Training and research activities in this area are under way but assistance, as requested in this grant, will enable the University to engage in new endeavors and expand its research and graduate instruction program so as:

A. To increase the capability of Kansas State University to render assistance to India and other developing nations in food grain utilization.

B. To enlarge the pool of scientists trained in grain handling, processing, storage and marketing interested in and capable of assisting India and other developing nations.

C. To increase professional awareness o the increasing importance of grain storage, handling, processing and marketing in developing countries.

D. To encourage college students to seek careers in international service in the braad area of grain utilization.

E. To provide an opportunity for graduate students to obtain research experience on problems of particular relevance to India and other developing countries by assisting with research activities carried out fully or in part in India.

F. To stimulate and encourage faculty and other professional staff to consider careers in international service and to increase faculty interest in and university commitment to agricultural problems of India and other developing countries by drawing upon their special relevant competencies in training and research.

III. MAJOR ACCOMPLISHMENTS

A. Program Development

The work plan for the year as projected in last year's report has been adhered to in all respects. The two graduate students who will conduct their thesis research in India have had their graduate program approved by their respective graduate faculty advisory committees, and have now completed all required courses for the Ph.D. degree in their major and minor fields. Their preliminary examinations will be taking place during the summer school session, 1970.

Permission to pursue graduate thesis research at the Central Food Technological Research Institute, Mysore, India, has been obtained from Dr. Parpia, the Director: and Dr. S.K. Majumder has agreed to supervise the work in India for Mr. Lockwood and Professor G.S. Bains has accepted a similar responsibility for Mr. Finney. Tentatively, the research outline agreed upon for these two students is as follows:

PROJECT OBJECTIVES FOR MR. LOCKWOOD'S RESEARCH:

Imported cereal grains will be processed by crude grinding and sieving procedures and by refined commercial operations and the products used for food purposes will be analyzed both quantitatively and qualitatively for chemical residues resulting from the use of chemicals to control insects.

Domestically grown cereal grains will be treated with the known amounts of the chemicals used commonly in India to control insect infestation. After various storage periods, samples of the cereal grains will be processed as indicated previously, and the food products tested for chemical residues.

PROJECT OBJECTIVES FOR MR. FINNEY:

Quality evaluation of Indian wheats, especially the newly introduced semi dwarf varieties, will be undertaken. Comparisons will be made with wheats of recognized and well established quality characteristics such as Manitoba and Dark Northern Spring and Dark Hard Winter wheats. Efforts will be made to evaluate wheats within the context of India's uses and needs. The present needs are for increased wheat yields but the longer range requirements will more and more involve quality considerations. As baking operations become more mechanized the need arises for higher and more uniform quality wheat. This is when quality considerations become important

Research will also be undertaken involving enrichment ingredients combined with wheat foods including soybeans, chick peas, cottonseed meal, sucroesters, glycolipids and other materials that will affect nutrition or baking properties. Mr. Finney has been working with members of the USDA Hard Winter Wheat Quality Laboratory on the biochemistry of components that control breadmaking. This experience should prove useful when undertaking work in India.

Both Dr. Majumder and Professor Bains have, at our request, indicated items of equipment not available at Mysore that would be needed for these research projects and we now have prices and company addresses and will purchase the needed items in time for the equipment to arrive when needed by the students.

Both Mr. Finney and Mr. Lockwood have participated in the department seminars throughout the year, and have also taken part in seminars and language sessions of South Asia Center on the campus. They have both profited from many exchanges of ideas, comparisons of cultures and habits with several Indian staff members and with many students.

B. Development of Research Competence

Mr. Lockwood has worked on analytical methods such as he expects to use in his research through arrangements with the Departments of Entomology and Biochemistry on the campus and has visited the laboratory of the Food and Drug Administration in Kansas City, Missouri, to gain knowledge on detection of minute traces of insecticides.

Mr. Finney has spent time in a United States Department of Agriculture Hard Red Winter Wheat Quality Laboratory, becoming thoroughly familiar with wheat quality evaluation techniques. This Federal Laboratory was established on the Kansas State University campus in 1936 and does all the wheat quality evaluation work for the entire Great Plains region. It has a full-time staff of about eight scientists, and the Laboratory has a world-wide reputation.

C. Development of Competence for Consultations and Service

Universities function essentially as training and research centers where qualified professionals impart knowledge and experiences to the younger generation. In the area of cereal processing and technology the Grain Science and Industry Department has a staff that is extremely competent, both with regard to broadness of education, industrial experiences, and extensive travel and consultation experiences on a world-wide basis. The entire staff, including the 211(d) professor, are involved on a daily basis with many foreign students, including Indian students and a large assortment of foreign visitors. Therefore, in accordance with the normal functioning of the university, we are daily putting our past experiences and training to use and, accordingly, increasing our competence for consultation and service. The two 211(d) graduate students are an integral part of the university's and the department's overall activities associated with cereal technology.

Lines of communication have been maintained between the university's International Activities Office, the South Asian Institute, and the International Agricultural Programs office. The university's programs in Nigeria and India are followed closely by everyone associated with the 211(d) India program and conferences with staff members who have returned from assignments abroad or are about to leave for foreign duty are commonplace.

The 211(d) professor maintains many contacts throughout the world dealing with cereal technology because of being the United States delegate to the International Association for Cereal Chemistry and a member of the organization's Executive Committee.

The 211(d) professor has written the following presentations this past year:

1. A study of U.S. wheats as supplements for Western wheats in European breadmaking. J. A. Shellenberger, D.K. Mecham and J.W. Pence, Agricultural Research Service, USDA ARS 74-52, August 1969.

2. The "Green Revolution" Revisited, J.A. Shellenberger, Current, September 1969.

3. Cereal Science - Chapter I Wheat. J.A. Shellenberger, The AVI Publishing Company, Inc. 1969.

4. Higher education for the baking industry, J.A. Shellenberger, The Baker. May 1969.

5. Prepared the following sections for the McGraw-Hill Encyclopedia of Science and Technology 1969:

Cereal Chemistry
Wheat Processing
Corn Processing
Rice Processing
Oats Processing
Barley Processing
Buckwheat Processing
Cereal Products
Feed Manufacturing

6. Wheat Chemistry and Technology, Chapter I, Production and utilization of wheat J.A. Shellenberger. American Association of Cereal Chemists, Inc., St. Paul, Minn. 1970.

7. Nutritional values of wheat and wheat by-products as affected by modern production and milling techniques. J.A. Shellenberger.

Wheat in Livestock Feeds Symposium, Oklahoma State University, Stillwater 1970.

8. The impact of new wheat production technology in the hard winter wheat area. J.A. Shellenberger.

Wheat Variety Quality Conference. Great Falls, Mont. 1970.

9. Chemical, rheological, and breadmaking characteristics of selected varieties of various wheat classes. J.A. Shellenberger, Y. Pomeranz, K.F. Finney, and A.B. Ward. Presented at the 5th World Cereal and Bread Congress, Dresden, G.D.R. 1970.

10. Historical development of the application of fungal and bacterial enzymes in the baking industry. J.A. Shellenberger. Presented at the 5th World Cereal and Bread Congress, Dresden, G.D.R. 1970.

D. Involvement of Other University Resources

Kansas State University continues to enlarge its programs in foreign countries. Programs involving grain storage, transportation, and processing have required staff members from the department to travel to several Central and South American countries and to Africa and Asia. All of these technical assistance programs are, in one way or another, related to the aims and objectives of the 211(d) program.

Many divisions of Kansas State University provide either direct or indirect support to the 211(d) program. Administrative services and advice are provided by the various international programs offices that have extensive overseas projects. In addition, the overall staff of the Department of Grain Science and Industry contributes in innumerable ways to the support of the 211(d) project by providing office space, secretarial services, library facitilites, as well as giving advice and encouragement to the two 211(d) students.

The University has, this past year, provided funds for the 211(d) professor to attend the White House Conference on Food, Nutrition and Health, Washington, D.C. attendance at the Executive Committee meeting of the International Association for Cereal Chemistry, Moscow, U.S.S.R., the Modern Cereal Processing Conference, Potsdam, German Democratic Republic, the International symposium on the use of wheat for livestock and poultry feeds, Stillwater, Oklahoma, and the Fifth World Cereal and Bread Congress, Dresden, German Democratic Republic.

IV. Expenditures

Original Budget Summary

	1968-69	1969-70	1970-71	1971-72	1972-73	Total
Faculty						
1. Salaries-1 (FTE)	$19,000	$19,000	$19,000	$20,000	$21,000	$98,000
2. Travel & per diem	3,000	3,000	3,000	3,000	3,000	15,000
Graduate Students						
1. Assistantships	8,400	8,400	9,000	9,000	8.000	42,800
2. Allowances	-0-	2,000	3,000	3,000	3,000	11,000
3. Travel	-0-	2,500	2,500	2,500	2,500	10,000
Exchange Professor						
1. Allowances (6 mos.)	6,000	-0-	-0-	-0-	-0-	6,000
2. Travel	1,400	-0-	-0-	-0-	-0-	1,400
Equipment and Supplies	2,000	4,700	2,600	1,600	1,500	12,400
Miscellaneous	200	400	600	600	600	2,400
Data Processing and Publication Costs	-0-	-0-	300	300	400	1,000
Totals	$40,000	$40,000	$40,000	$40,000	$40,000	$200,000

Actual Budget Summary

Salaries	$16,887	$20,277
Stipends	700	8,400
Travel	-0-	-0-
Living Expenses	-0-	-0-
Exchange Professor	-0-	-0-
Travel	713	606
Equipment & Supplies	73	780
Totals	$18,373	$30,063

Estimated Budget

	1970-71	1971-72	1972-73	Total
Salaries	$25,000	$25,000	$25,000	$75,000
Stipends	10,000	15,000	15,000	40,000
Travel	2,500	2,500	2,500	7,500
Living Expenses	3,000	4,500	4,500	12,000
Exchange Professor				
Travel and subsistence	2,500	---	---	2,500
Equipment and Supplies	4,000	5,000	5,564	14,564
Totals	$47,000	$52,000	$52,564	$151,564

Mr. Lockwood and Mr. Finney, accompanied by their wives, will leave for India about September 1st. There will then be expenditures for travel, living expenses, and for equipment and supplies. Thus, the budget for the next fiscal year differs considerably from that of the past.

V. Plan of Work for Next Year and Budget Estimate

The two graduate students will arrive at the Central Food Research Institute at Mysore, India, about September 1st, 1970. Their research will continue for the ensuing year according to the plans already agreed upon.

We expect to add an additional graduate student to the program starting with fall term, 1970. The student may be a candidate for either the M.S. or Ph.D. degrees.

Professor G.S. Bains has been invited to visit Kansas State University to conduct a series of seminars on cereal technology and for discussions of the 211(d) program with the staff of the Department of Grain Science and Industry.

UNIVERSITY OF MISSOURI

COLLEGE OF AGRICULTURE

DEPARTMENT OF AGRONOMY

ANNUAL TECHNICAL REPORT OF 211(d) PROJECT

July 1, 1969 through June 30, 1970

SECOND ANNUAL TECHNICAL REPORT
U.S.A.I.D. 211(d) GRANT
UNIVERSITY OF MISSOURI COLUMBIA
(July 1, 1969 through June 30, 1970)

TITLE OF GRANT: A grant to develop within the University of Missouri Columbia, specialized competency in the breeding of agronomic crops in India.

I. SUMMARY:

The 211(d) program in plant breeding at the University of Missouri has made excellent progress in developing an international dimension in teaching and research, in increasing competency for consultation and service, and in involvement of University resources in these activities.

An awareness is growing in the Agronomy Department Staff of the need for broadening our teaching to include worldwide agronomic problems and practices. This is being reflected in the content in the individual courses. As an example the beginning crops course "Plant Science" now has about ten percent of its content oriented specifically toward international agronomy.

Expanding the international dimension in our teaching has been possible both by the assistance of the International Professor, who is employed through the 211(d) grant, and through the reutrn to the campus during the year of four professors in Agronomy each of whom has spent two or more years in India on the University of Missouri AID contract programs. In addition to the International Professor, the 211(d) grant provides stipends for two students who will go to India for thesis research.

The International culture of the Department has been broadened through the training of foreign students. During the year the Agronomy department provided financial assistance to one post doctoral and four graduate students who are foreign nationals and five other foreign students receiving outside financial assistance are studying in the department.

The AID 211(d) grant has made it possible for the International Professor to travel to India where he was priviledged to participate in the wheat and pulse breeding programs of the Orissa University of Agriculture and Technology. While there he assisted Dr. Sinha in the evaluation of the wheat breeding materials and establishing objectives for a wheat breeding program being developed in Orissa. Research problems evolving from these programs will be developed as thesis problems for the graduate students who go overseas.

The International Professor has participated in various conferences both in the U.S. and in India and presented several lectures during the year pertaining to world food production and to the contribution of the "Green Revolution" to food production in India.

The University, the College of Agriculture, and the Department of Agronomy have each taken positive steps to improve their international dimension and to make their international activities a legitimate and ongoing University function through the establishment of University-wide and Campus Centers of International Studies, appointment of an Associate Director for International Programs in the College of Agriculture, and participation in long range planning efforts in India.

Specific contributions of the University to the Program initiated by the AID 211(d) grant have included office facilities and secretarial services to the International Professor; land, labor, equipment and technician assistance for conduct of field research: laboratory research facilities: agricultural experiment station chemical laboratory services: computer services; research funds through an experiment station project: and library facilities including the purchase of new books on plant breeding and tropical agriculture.

The resources of the present grant will not permit starting additional graduate students. Since the grant already covers the Professor's salary, travel, and other major operational expenses, its efficiency could be improved by increasing the grant sufficient to add one or more graduate students. This would require an added expenditure of only $10,000 per year over a 3-year period for each graduate student added to the program.

II. GRANT OBJECTIVES:

The overall objective of this grant is to increase the general competency of the University of Missouri, Columbia, to generate knowledge and render assistance in the international area of plant breeding, and to establish this area of specialization as a legitimate and continuing function of the University.

The specific objectives of the grant are to:

1. To increase the capability of the University of Missouri to render assistance to India (and other developing nations) in the general area of plant breeding.

2. To increase the pool of scientific manpower trained in plant breeding interested in and capable of assisting India (and other developing nations).

3. To create a professional awareness of the international dimensions of plant breeding.

4. To stimulate interest of plant breeders in international service careers as employees of private or public entities.

5. To encourage college students to seek training leading to careers in international plant breeding under private or public auspices.

6. To provide an opportunity for graduate students to obtain research experience on problems of particular relevance to the developing countries (to the maximum extent feasible, by assisting with research activities carried out wholly or partially in India.)

7. To increase interest in and knowledge about the agricultural problems of India by drawing upon all relevant special competencies of staff members of the Department of Agronomy and other departments of the University.

The activation of the grant objectives is built around the employment of a full-time faculty member who will teach, conduct research both in the U.S. and overseas, supervise graduate students, and carry out other activities pursuant to the grant objectives. The activities are designed to create a professional awareness of the service opportunities in the international area of plant breeding, to train graduate students for careers devoted to assisting developing nations in the discipline of plant breeding, and to provide research experiences overseas (in India) which will assist in the personal development of the professor and the graduate students and thereby increase their competentcy to understand the agricultural production problems of developing nations and to contribute toward the solutions of those problems.

This grant is one of six separate disciplinary grants being coordinated through the Council of United State Universities for Rural Development in India. The UMC grant is focused on the development of educational competence and research expertise in plant breeding as related to agricultural development in India.

The period covered by this report is from July 1, 1969 through June 30, 1970.

III. MAJOR ACCOMPLISHMENTS:

In the first annual technical report, Dr. J. M. Poehlman was identified as the International Professor of Agronomy (Plant Breeding) and Mr. John M. Yohe, a Ph.D. candidate, as a graduate assistant supported by 211(d) funds. Professor Poehlman continues to be identified with this project and has directed the activities throughout the year. During the year he traveled to Mexico, India, and Afghanistan in the interests of the program. Mr. Yohe has devoted much of his time during the current year to study and to meeting course requirements, but has also conducted preliminary research on various pulse species at the Missouri Agricultural Experiment Station. As a result of this work, and following discussions this winter with the Indian Professor who will advise his research in India, it has been decided to confine Mr. Yohe's Ph.D. dissertation studies to the mung bean or green gram, Phaseolus aureus. Mr. Yohe should complete his course work and comprehensive examinations during the coming year and it is planned that he spend the 1971-72 year overseas.

Mr. Earl Watt has also been appointed a Graduate Assistant from the 211(d) funds. Mr. Watt is a graduate of Graceland College, Lamoni, Iowa, with a major in mathematics and has taught mathematics in high school for two years. Mr. Watt has completed one year of graduate work in Agronomy and will conduct research with winter wheat X Mexican spring wheat crosses for an M.S. thesis. Tentative plans are that he spend the 1972-73 year overseas.

One or more additional students with excellent scholastic ability and commitment to international agricultural work are available and would like to participate in this program. Additional funds will be required before we can add more students to the program.

Excellent progress has been made during the ensuing year in all phases of the 211(d) program - teaching, research, competence for consultation and service, and involvement of other University resources. This has been possible because of the financial assistance, cooperation, and support received from the University of Missouri, Columbia, which supplement the expenditures from 211(d) grant funds.

A. Development of Teaching Competence.

The teaching competence of the Department of Agronomy in the International area has been greatly enhanced by the USAID grant from 211(d) funds because it has permitted the employment of an International Professor and graduate assistants who are focusing on a world wide perspective in plant breeding. The grant assists in the development of this perspective by providing opportunity for travel, study, and participation in plant breeding research in India and other countries.

Students in plant breeding at the University of Missouri also benefit through the broader perspective which the International Professor can bring to the courses he teaches. During the past year the International Professor taught the introductory course in plant breeding. Enrollment in this course is largely by undergraduates with a few agronomy graduate students transferred from other institutions or graduate students from other departments such as Entomology or Plant Pathology. In this course the contributions from the breeding of wheat, rice, and other crops to the agricultural development and food production of india and other developing countries are covered through lectures, slides taken in India by the professor, class discussion, assigned readings, and term papers. The text book, "Breeding Asian Field Crops", developed by the International Professor in collaboration with an Indian author and published in India, has been especially useful as a source book.

Means by which the Department of Agronomy can enhance its competency for participation in International Agricultural Programs was discussed by the International Professor in an Agronomy Department seminar. This is one of several seminars presented by the International Professor in Agricultural Development in India, world food production and the contribution of the Mexican wheats to the "Green Revolution". These seminars were illustrated with slides taken in India, the Philippines and other countries.

Mr. John Yohe, a graduate assistant supported from 211(d) funds, also presented an Agronomy Departmental Seminar on pulse cultivation in India.

The International perspective is not limited to courses in Agronomy taught by the International Professor. It is the policy of the Department of Agronomy to broaden the course content of all existing courses by introduction of an international dimension rather than to introduce new courses limited to international areas. For example, in the introductory Plant Science course about ten percent of the course content is internationally oriented. The undergraduate seminar contains two or more presentations each semester directed to international agronomic problems. Similar emphasis on international agriculture is being made in other courses. We feel this policy will reach the maximum number of students and made this instruction an ongoing departmental function, although it may be less visible than the introduction of new courses.

The competentcy of the Department of Agronomy to broaden instruction and to teach crops and soils from an international viewpoint has been enhanced, also, by return within the year of four staff members with overseas experience: Dr. Dale T. Sechler, Associate Professor of Agronomy, Dr. William Upchurch, Associate Professor of Agronomy, Professor William J. Murphy, (Crops Extension), and Professor John Falloon (Soils Extension). Each of these men have completed assignments of two or more years on one of the University of Missouri contract programs in India. Dr. Sechler teaches a course in Grain Crops Production and Dr. Upchurch teaches sections of the course in Soil Science. Professor Murphy has given more than 20 talks to farm groups in Missouri in which the agricultural production problems in India were discussed. Professor John Fallon (Soils Extension), just recently returned, also will be making talks to farm groups. Dr. Sechler, Dr. Upchurch and Professor Murphy each have given Agronomy Departmental Seminars on various aspects of agronomic problems and Agricultural development in India.

The Department of Agronomy sponsors a number of postdoctoral and graduate assistantships for foreign nationals in order to broaden our cultural environment and as a service to international agricultural development. In 1969-70 one postdoctoral and four graduate assistants who were foreign nationals were supported by departmental funds. Five foreign graduate students with outside support studied in the Department. These students came from Taiwan, Libya, India, Thailand, The Philippines, and Canada.

The 211(d) Professor during this period served as adviser to four foreign students as follows:

Mr. Ragbier Athwal, (Ph.D), India, supported by Department of Agronomy
Mr. Shu-Ten Tseng, (Ph.D), Taiwan, supported by Department of Agronomy
Mr. Praphas Weerapat, (Ph.D),Thailand, supported by Rockefeller Foundation.
Mr. Mohammed Elmigri, (M.S.), Libya, supported by Friends of Libya.

B. Development of Research Competence.

The development of the research competence of the International Professor has been enhanced by the 211(d) grant through the opportunity it has afforded him to work with a Professor in India, and to actively participate in Indian wheat and pulse breeding problems encountered under some specific conditions in India and an opportunity to contribute in research designed to alleviate the adverse problems.

In the First Annual Technical Report it was stated that arrangements for cooperative research and the training of graduate students had been worked out with the Orissa University of Agriculture and Technology, Bhubaneswar, Orissa, where the University of Missouri is assisting on an Agriculture University Development Grant from A.I.D. Informal cooperation has been established between Dr. Poehlman and Dr. S. K. Sinha, Chairman, Department of Agricultural Botany, OUAT, whereby Dr. Poehlman will assist in the development of wheat and pulse breeding programs in Orissa. From these programs thesis research studies will evolve and Dr. Sinha will serve as the students overseas adviser.

(1) Research on Wheat.

The O.U.A.T. wheat research program was initiated at Bhubaneswar in 1968-1969 when crosses were made between adapted Indian spring varieties and 1-gene, 2-gene, and 3-gene Mexican dwarf spring varities. The F_1's were grown at Columbia in the spring of 1969. Additional crosses were made at Colubmia including winter X Mexican dwarf spring varieties. Parents, F_1's and F_2's of various crosses were grown at Bhubaneswar during the winter of 1969-70 and additional crosses made. In addition there was grown at Bhubaneswar the 4th, 5th, and 6th International Spring Wheat Nurseries; miscellaneous wheats from CIMMYT, Mexico; two all-India spring wheat nurseries; and F_2 population of winter wheat X Punjab 3-gene dwarf; and an F_3 bulk of Triticales received from CIMMYT.

Two major breeding objectives were identified as a result of the wheat plantings at Bhubaneswar in 1969-70: the need for (a) early maturity, and (b) resistance to Helminthosporium sativum. The Mexican dwarf varieties of wheat appears to be particularly susceptible to the Helminthosporium organism. F_1 plants from a Stadler cross onto the Mexican 1-gene, 2-gene and 3-gene dwarfs appeared to be more resistant from F_1's from crosses with adapted Indian X Mexican dwarf varieties. It is expected that the winter X Mexican dwarf crosses may be useful both in India and in Missouri since the spring segregates may be used in the India program and the winter segregates in the Missouri wheat breeding program. It was also noted that F_1's of crosses from Stadler X 3-gene dwarf were shorter than would be predicted from the current recessive gene explanation for dwarfness in the Mexican wheats. Mr. Watt has initiated an experiment which may give some information on this point.

The International Professor was particularly priviledged to assist in the evaluation of the wheats in the field at Bhubaneswar as well as to visit the extensive and excellent wheat breeding programs conducted at the Indian Agricultural research Institution and the Uttar Pradesh Agricultural Universities. Dr. Sechler is giving valuable assistance to the cooperative wheat research at columbia. Since Dr. Sechler's return from India he has assumed leadership of the wheat breeding project at Columbia, a position Dr. Poehlman had occupied for the past 34 years.

Expenses of the cooperative wheat research at Columbia is borne by the Missouri Agricultural Experiment Station and that at Orissa by the Orissa University. Expenses of a trip by the International Professor to Obregon, Mexico, to visit the CIMMYT program and collect breeding materials was paid by the Missouri station. Travel to India was possible from the 211(d) grant.

(2) Research on Pulses.

During 1969, Mr. John Yohe grew 28 cultivars of pulses at Columbia. These included green gram (Phaseolus aureus), black gram (Phaseolus mungo), chick pea (Cicer arietinum), arhar (Cajanus Cajan), and lentil (Lens esculenta). Best results were obtained with the green and black gram. The seed is being evaluated for total protein, lysine, and tryptophan by the Missouri Agricultural Experiment Station Laboratories. During the 1970 visit of Dr. Poehlman to Orissa it was decided, after further discussion with Dr. Sinha and Dr. Misra, pulse research officer for the Orissa Department of Agriculture, to limit our research as well as the breeding work at OUAT to green gram (Phaseolus aureus).

Green gram or mung bean is the principal pulse crop in Orissa: yet no breeding has been done on that species in Orissa. The Major breeding work on green gram has been in North India where it is grown during the long days of summer. In Orissa, the crop is grown during the short days of winter, so we are interested in its adaptation to photoperiod as well as its productive capacity and nutritive value.

Mr. Yohe has obtained collections of green gram from the U.S.D.A., Oklahoma, California, Orissa, and the Punjab. As a result 321 cultivars will be grown at Columbia in the summer of 1970. This research, other than Mr. Yohe's stipend, is supported largely by the Missouri Agricultural Experiment Station.

Our research with pulses has stimulated interest with a large food processing plant located in central Missouri that uses green gram in their processed foods. Currently they import their supply of this crop but would like to be able to obtain it locally.

The International Professor visited the pulse research programs at New Delhi, Orissa, Bihar, and Madhya Pradesh while in India this winter. His trip to New Delhi was scheduled so that he could attend the Pulse Workers Conference, however, the conference was postponed until April at which time he had already left India.

C. Development of Competence for Consultation and Services.

The 211(d) grant to the University has made it possible for a plant breeding professor in agronomy to develop international interests and to integrate this international dimension into his teaching, research and training of graduate students. Major activities participated in throughout the year by the International Professor which reflect the development of competence for consultation and service are listed below:

(1) International Travel. A return visit to India during January to March 1970 was made by the International Professor on 211(d) grant funds. During this visit he assisted Dr. Sinha in the evaluation of the wheats being grown at OUAT, Bhubaneswar, and in the identification of major objectives for the OUAT wheat breeding program. Wheat research programs were visited at the Indian Agricultural Research Institute, New Delhi; Uttar Pradesh Agricultural University, Pantnagar; Jawaharlal Nehru Agricultural University, Jabalpur; Bihar State Department of Agriculture, Patna; USAID wheat program, Kabul, Afghanistan; and the wheat and maize breeding laboratory, University of Madrid, Spain. Conferences were scheduled with the wheat research workers at Rockefeller and Ford Foundations, New Delhi. The trip was scheduled so that these institutions could be visited at the optimum time for viewing the wheat in the field.

Pulse research workers and field plantings of pulses were visited at the Regional Pulse Improvement Project and IARI, New Delhi; and also at Pantnagar; Jabalpur; Patna; and Nayagarh, Orissa. Dr. Misa at Nyagarh has made extensive local collections of green gram from farmers fields in Orissa.

The ornamental Breeding Laboratory at the National Botanic Gardens at Lucknow was visited. Dr. Kushoo has developed one of the world's foremost research programs of this kind.

The International Professor gave a seminar to the Plant Breeding Department at JNAU, Jabalpur, and participated in and presided at one session of a Crop Plant Evolution Symposium, at IARI, New Delhi, which was sponsored by the Indian Society of Genetics and Plant Breeding. He also attended symposiums on seed cleaning machinery and wheat quality at IARI.

(2) International Barley Genetics Symposium. The International Professor attended and was joint author of a paper presented at the IBGS, Pullman, Washington. While in Pullman he visited the extensive wheat breeding nursery of Dr. Orville Vogel. Dr. Vogel made the Norin 10 X Brevor cross which produced the Gaines variety of wheat. The Norin 10 X Brevor cross provides the genetic background for the Mexican dwarf wheats.

(3) CIMMYT. The wheat breeding nurseries of CIMMYT at Obregon, Mexico, were visited by the International Professor and while there arranged for the International Spring Wheat Nurseries and bulk Triticales to be grown at Bhubaneswar in 1969-70. Through CIMMYT, sponsored by the Rockefeller Foundation and Mexican government, the Norin 10 X Brevor genetic backgrounds were introduced into spring wheat varieties. The resulting "Mexican" Dwarf spring wheats have supplied the breeding materials for the "Green Revolution" of wheat in India.

(4) Local Travel. Local travel by the International Professor included attendance at the following conferences:

American Society of Agronomy Annual Meeting, Detroit Michigan, where he participated in discussions by the Cereal Variety Review Committee of which he is a member. (November, 1969).

Conference on World Food Production, Manhattan, Kansas. (September, 1969).

AID Symposium on Institution Building, Washington, D.C. (December, 1969).

(5) Lectures and Seminars. The following lectures and seminars were given by the International Professor:

American Society of Agronomy Visiting Scientist Lecture, MacMurry College, Jacksonville, Illinois, "World Food Production with Focus on India".

A.S.A. Visiting Scientist Lecture, Topeka University, Topeka, Kansas, "Agricultural Development in India". A second lecture was given to biology majors on "Agronomy as a Profession".

North East Missouri State College, Kirksville, Missouri, Seminar on Asian Problems, "The Green Revolution and Agricultural Development in India".

Seminars were also presented to the Department of Agronomy, University of Missouri, Columbia; and Department of Plant Breeding, Jawaharlar Nehru Agricultural University, Jabalpur, M.P. India.

(6) Graduate Student Participation. One of the advisees of the International Professor, Mr. Praphas Weerapat from Thailand, was invited to participate in a Seminar on South East Asian Agricultural Development and World Food Production, Honolulu, sponsered by the Asian Society.

(7) Involvement of other staff. Acknowledgement must be made of the competence in the Department of Agronomy afforded by the four staff members who have served for two or more years each on AID programs in India (Professor's Sechler, Murphy, Upchurch and Falloon). Dr. Sechler has given strong support to the program through his cooperation on the wheat reaearch, assistance to graduate students on the 211(d) program as well as foreign students in the department, and assistance in teaching while the International Professor was in India. Also, the Department Chairman, Dr. Roger Mitchell, has supported the program vigorously.

D. Involvement of other University Resources.

The purpose of the 211(d) grant was to make it possible to initiate teaching and research in plant breeding with international dimensions which would serve as a catylist to stimulate additional support. Considering the small size of the grant and limitations on its utilization it should not be expected that revolutionary changes would come about in the first or even the second year of its operation. However, it now appears that the influence may be greater than anticipated. Some of the developments within the University and the College of Agriculture, as well as the Department of Agronomy, reflecting competence in the international area are described below. Not all of these developments can be credited to the 211(d) grant, in fact some of them would have happened had there been no 211(d) grant, but this grant is an important contributor in the total University involvement.

(1) University-wide and Campus International Study Centers.

Both a University-wide Center and individual International Studies Centers on each of the four UM Campuses have been established at the University of Missouri. The International Professor has had an important role in the development of the Columbia campus center and in shaping its policies as Chairman for the past three years of the UMC campus International Faculty Committee and as the UMC faculty representative on the University-Wide International Studies Committee.

(2) Director of International Agriculture Programs. A Director of International Programs has been appointed in the College of Agriculture.

(3) Long Range Planning. The College of Agriculture has participated in two long-range planning efforts in India over the past several months. These involve the Orissa University of Agriculture and Technology and the newly formed Assam Agricultural University. A task force from the College of Agriculture has been active in involvement of Departmental and individual faculty resources in the long range planning effort. Two members of the Agronomy Department, Dr. Sechler and Dr. Upchurch have served on this task force.

(4) Agronomy Department Commitment. The Department of Agronomy has made a long range commitment toward the OUAT and AAU plans which will require far more staff members than can be trained through the present 211(d) grant program at its present level of support. One new staff member, Dr. Roger Hanson, has been added to the Agronomy Department staff and is awaiting clearance to go to India.

(5) UMC Contribution. The Department of Agronomy and the Missouri Agricultural Experiment Station has provided the International Professor and his students with office and laboratory facilities; secretarial services: land, equipment, labor, and technician assistance for conduct of field research; chemical laboratory services; computer services: and research funds through an Agricultural Experiment Station project.

(6) Library. The University of Missouri Library has added from its funds numerous books on plant breeding, tropical agriculture, world food production, and related fields as requested by the International Professor and other Agronomy staff members.

(7) Mung Bean Collection. The USDA has made available to the Department of Agronomy its collection of green gram or mung bean (phaseolus aureus) which numbers 190 entries. The Oklahoma Agricultural Experiment Station has supplied us with 41 varieties of green gram. The IARI collection of green gram has been requested for study at OUAT in India.

(8) Wheat Varieties Resistant to Helminthosporium. The literature is being search for sources of resistance to Helminthosporium sativum in wheat which may be utilized in the Orissa wheat breeding program. The observations made in 1970 in Orissa indicate that Bhubaneswar would be an excellent place to screen for resistance. Positive identification of sources of resistance would be useful to wheat breeders in many areas of the world.

IV. EXPENDITURES

The original budget, actual expenditures for the 1968-'69 and 1969-'70 years, and projected expenditures through 1973 at the present rate of funding is given below:

	Original Budget	1968-69	1969-70	1970-71[a]	1971-72[a]	1972-73[a]	Totals
Salaries	114,000	24,209[b]	25,200	25,200	26,400	27,400	128,409
Stipends	52,000		4,229	7,665	11,260	11,900	95,054
Travel	21,000	956	1,042	1,000	1,500	1,500	5,998
Equipment & Supplies	13,000	239	500	10,000[c]	3,000	3,850	17,589
Subtotals		25,404	30,971	43,865	42,160	44,650	187,050
International tickets (est.)		1,350	1,350[d]	1,300	4,500[e]	4,500[e]	12,950
Totals		26,754	32,271	45,165	46,660	49,150	200,000

[a] Estimated.

[b] Includes stipends paid in 1968-'69

[c] Includes purchase of three growth chambers now on order.

[d] Estimate of cost of international tickets. Official cost of tickets has not been received from the Grant Office.

[e] Includes estimated cost of round trip tickets to India for graduate student and wife.

Explanation of 1969-70 expenditures are as follows:

Salaries: Salary and staff benefits for the 211(d) Professor, Dr. J. M. Poehlman.

Stipends: Mr. John M. Yohe and Mr. Earl Watt.

Travel: Expenses to AID Meetings at Washington and Chicago, conference at Manhattan, Kansas, and personal expenses on trip to India.

Equipment & Supplies: Photo service, airfreight, expenses preparatory to India trip, peat post and miscellaneous. (No equipment items purchased in 1968-'69 or 1969-'70 which exceeded $100 in value.)

As may be observed from the extension of the budget through 1973, no change in the major pattern of funding from the original budget is anticipated. The budget provides for Mr. Yohe to go to India in 1971-'72 and Mr. Watt in 1972-'73.

V. WORK PLAN FOR 1970-'71

Plans for 1970-'71 call for the International Professor to return to India during February and March. He will teach a graduate course in Plant Breeding during the first semester and an undergraduate course during the second semester except for the period that he will be in India, during which time it will be taught by Dr. Sechler.

During 1970-'71 Mr. Yohe will complete his course work and comprehensive examination for the Ph.D. degree and continue his research on pulses. Mr. Watt will complete the major portion of his course work and initiate thesis research for the M.S. degree.

The research programs on wheat and pulses discussed in this report will be continued. Growth chambers will be installed so that growing conditions which will reproduce the Indian climate may be provided.

Additional funds will be needed to add additional graduate students to the program. It is estimated that $10,000 per year over a three to five year period will be required for each additional student added. For example if $10,000 were to be added beginning in 1970-'71 one additional student would be added, or if $20,000 were added for the same period, two students would be added. This would make the total expenditure more efficient since the number of graduate students trained would be increased without additional costs for Professor's salary, travel, or other major program operational expenses.

An extension of the grant after the present 1973 termination date is also urgently needed, otherwise it will not be possible to add students after the 1970-'71 year and expect them to get prepared and go to India during the term of the grant.

THE OHIO STATE UNIVERSITY

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

DEPARTMENT OF AGRONOMY

ANNUAL TECHNICAL REPORT OF 211(d) PROFESSOR

JULY 1, 1969 to JUNE 30, 1970

Technical Report

211-d International Program

The Ohio State University

June 30, 1970

The Contribution of the 211-d Program to the total University capability in the area of Agronomy.

The second year of the 211-d program at Ohio State University has resulted in the continued development of the campus' capability in the Agronomic area. This improvement has been manifested in the following ways:

1. Three new graduate courses have been introduced and are being taught in the Agronomy department. These courses are titled, Sugarcane Physiology and Nutrition, Agroclimatology, and Plantstress physiology. Within the context of these courses a strong international dimension has been introduced as a result of the student and faculty interest generated by the other courses that originated with the 211-d program.

   Two of these courses are being taught by Dr. L. D. Baver past director of the Sugarcane Research Station, Honolulu and who has added a viable impetus to the international interests of our department with his world-wide experience and unfailing enthusiasm.

2. Plans and preparation for the five week course in international agronomy with emphasis being placed on the utilization of soil-plant-water resources in world food production, are continuing and will be in progress when this report is submitted. The five week seminar series will feature a weekly guest speaker who will lecture from 2 to 3 p.m. Monday through Friday. Students, faculty from other universities, government personnel, and industrial agronomists have been invited to attend all or any of the seminar. Each speaker will deliver a lecture open to the general public on Monday evenings at 8 p.m.

The five guest speakers and the dates for their participation are as follows:

June 22-June26, Dr. R. W. Richardson, Jr., Deputy Director, The Rockerfeller Foundation.

June 29-July 3, Dr. E. Malavolta, Dean, University of Sao Paulo, Brazil.

July 6-July 10, Dr. E. J. Wellhausen, Director General, International Maize and Wheat Improvement Center, Mexico.

July 13-July 17, Dr. R. Bradfield, Special Consultant in Agriculture, The Rockerfeller Foundation.

July 20-July 24, Professor E. W. Russell, Department of Soil Science, The University, Reading, England.

This international symposium has involved faculty of both the Agronomy and Horticulture departments and this along with the technical content of the presentations will be extremely instrumental in advancing the capability of these departments in the international arena.

The cost of Professor Russell's visit is the only one of the five for which 211-d funds are being used. However, without the 211-d source the entire program would not have been even conceived.

3. Library acquisitions pertaining to the area of international agronomy have increased substantially during the past year. This increase has taken place through regular departmental funds. Approximately one hundred publications in this field have been added.

4. The College of Agriculture and Home Economics is formulating a long range plan to develop an operational blueprint for the next 30 years. The task force for Agronomy (as well as other departments) has recognized the importance of our international commitments and has devoted a major portion of their plan to the international aspects of research and teaching for the next three decades. The following is a summary quote from the long range plan for Agronomy under the heading of International Affairs:

   'In the future, student exchange for a school year will become more common. Faculty exchange will also continue but probably for shorter terms. If the 211-d program is successful, it should provide an opportunity for more graduate students to conduct research and to collect research materials in other countries.

   The 211-d concept has significantly influenced the thinking of all faculty and students of the department and a growing international component continues to be injected into established undergraduate and graduate courses.

5. There are now two graduate students in the department who will be doing part of their research in foreign countries. These students are not those supported by the 211-d program, but have responded to the concept generated by the program.

The Objectives of the 211-d Grant

The objective of the 211-d program at the Ohio State University is to develop within the university an expertise and capability in international agriculture in the area of Agronomy, specifically soil-plant-water relationships. The educational role of the University is pursued through the continued involvement in the international sector in the areas of research and teaching in order to acquire new knowledge and develop internationally trained personnel.

In order to fulfill the stated objectives, India is being used as a "laboratory".

Major accomplishments during the year in meeting the objectives of the grant.

a. Development of teaching competence.

A sincere attempt is being made to involve all faculty with significant international experience in the teaching functions of the department, in order to inject the international component into as many of our courses as possible. There are now eleven courses in the department being taught by faculty with recent research experience in developing countries. This represents an increase of eight courses in this category since the inception of the 211-d program.

During the Fall Quarter 1969 the 211-d professor continued to teach the courses in Soil Fertility and Tropical Soils. The course Crop Production in Developing Countries was again taught by Dr. L. D. Baver who is currently teaching two new courses, Sugarcane Physiology and Nutrition, and Agroclimatology.

Dr. F. L. Himes, Professor of Soils, Department of Agronomy, Ohio State University and a member of the International Education Committee of the American Society of Agronomy has collated a compendium of crop and soil science courses with international applications at major U.S. universities. Comprehensive course descriptions and letters describing internationally-oriented teaching efforts and included in the compendium which will be regularly updated and expanded as information becomes available. The compendium is available on short term loan to interested parties and copies may be purchased at the cost of reproduction from the head office of the American Society of Agronomy.

The growing interest in international agronomy, on the part of the students, has resulted in a steady increasing enrollment in those courses dealing with crops, soils and climate of the developing countries. Because of this interest and the volume of material that needs to be covered a program of teaching and

involving three new courses (Tropical Oil and Fiber Crops, Tropical Root Crops, and Tropical Pasture and Forage Science) has been submitted for funding through University channels. This is in association with the university's six year program projections. The chances, unfortunately, of State Legislative appropriations for such programs are remote and an effort will be made through the long range planning programs to indluence the state legislature to support university international commitments.

b. Development of Research Competence

Although the following discussion deals primarily with research being performed on Indian soils and under Indian conditions, it is presented here to demonstrate the strengthening of the Ohio State University's capability in international agronomy as stimulated by the 211(d) program.

Research areas for two of the three graduate students supported by the program have been completed and two Indian professors have agreed to work with the students during their stay in India. Both students will be in India during 1971, one located at the Punjab Agricultural University and working with Dr. N.S. Randhawa, the other located at the University of Agricultural Sciences of Mysore State and working with Dr. Perur. The third student supported by the program is not expected to visit India until 1972.

Work in the Punjab will involve the study of zinc deficiences on grain crops. The soils of the area are relatively light textured with a very level topography. In years past the problem of zinc deficiencies was relatively unknown due to low yields and low fertilizer and irrigation inputs. With the high yield now being obtained and the higher inputs being used, there are localized incidences of zinc deficiencies. A survey of the soils of the area shows that what are now localized cases will be massively affected areas in a few years with the continued removal of high yields. Work has already been started by Dr. Randhawa on this problem so the graduate student supported by the 211(d) grant will be involved in an on-going program.

The student working in Mysore state will also be involved in a program that is in progress. His contribution will be in determining extraction procedures for phosphorus as an index in soil-test plant-yield correlation studies. In order to place fertilizer recommendations on a sound basis this work is being initiated and the participating student working with Dr. Perur will be in a position to make a contribution while acquiring new knowledge about the soils of the area.

During the past year soil samples have been received from Mysore and Punjab states. Basic analyses have been performed on the soils from Mysore and potassium studies are being conducted by the 211(d) professor on several samples from the Punjab.

In collaboration with Dr. G.S. Sekhon of the Punjab Agricultural University, it has been determined that crops growing on many soils of that area, very low in available potassium, have failed to respond to applications of that element. Chemical and mineralogical studies are being conducted to determine the reason of this lack of response in order to devise means whereby continued good yields can be assured if and when the potassium reserves are depleted. The possibility of early depletion of the reserved is very real in view of the light texture and extensiveness of the soils. Present indications are that free micas are acting as potassic reserves. Publications with Dr. Sekhon will be forthcoming when this research is completed next year.

c. Development of competence for consultations and service.

Under the auspices of our OSU/USAID/PAU contract NESA 147 program Dr. G.S. Sekhon was able to visit Ohio State University to work with the 211(d) professor and other members of the faculty. Out of this relationship arose the opportunity for investigating the potassium problems on the Punjab soils. Dr. Sekhon's seminar presentations and consultations with faculty and graduate students contributed greatly to the department's awareness of Indian development.

Visits to the Rothamsted Experiment Station, Harpenden, England while in transit from India were useful from the stand point of establishing useful contacts with Dr. John Coulter their expert in tropical soils. Dr. Coulter will be visiting Ohio State University in October of this year to address the graduate faculty and students and will be supported by university visiting lecture funds. A similar visit to Spain in transit to India was not as fruitful in establishing meaningful contacts.

Because of his international affiliation under the auspices of the 211(d) grant the 211(d) professor has been made chairman of the international Affairs Long Range Task Force Committee for the College of Agriculture. This committee is responsible for formulating a policy and workable plan for the next 30 years by which the College of Agriculture, Home Economics and Natural Resources can execute its international commitments. As the long range plans are being formulated it is becoming increasingly clearer that the 211(d) concept will have a major influence on, if not dictate, the future course of university agricultural and home economic international commitments.

The 211(d) professor and other members of the department have participated in several internationally related conferences and affairs during the past year. Faculty have been named to the International Committee on Tropical Soils sponsored by the National Academy of Science and Natural Research Council and to the International committee of the American Society of Agronomy. Meanwhile every opportunity to publicize the objectives of the 211(d) program has been exploited.

d. Involvement of other university resources.

The Ohio State University continues to expand its programs in the international field. Recently a full-time Dean of International Affairs, Dr. Osbourne Smallwood, has been appointed for the University, thereby expressing the increased emphasis being placed by the university on international programs.

Efforts in the College of Agriculture and Home Economics have been further intensified during the past year. The study abroad program which started in 1969 with two junior year students studying at the Punjab Agricultural University has now grown to four students, three of whom will be studying in India and one in Brazil. Some financial assistance from the university is now available for students who wish to participate in this program.

During the past year the College has emphasized its commitment to international affairs by the formation of its international affairs task force, referred to earlier.

Other departments within and outside of the College of Agriculture are moving ahead with the stated intent to have at least one faculty member as an international professor as soon as finances are available.

Of the fourteen foreign graduate students currently enrolled in the Agronomy Department, eight are supported by university and experiment station funds. This represents a continuing effort on the part of the university and similar support in other departments is not uncommon.

Expenditures

During the year 1 July 1969 to 30 June 1970 the following expenditures were made:

Salaries and retirement	$19,202.73
Graduate Student stipends	12,600.00
Travel	1,764.13
Miscellaneous	253.50
Total	$33,820.36

Total expenditures since the inception of the project to 30 June 1970 has been $51,253.54.

Salaries and retirement includes the salary of the 211(d) professor while graduate student stipends includes support for three students, two Ph.D. candidates receiving annual stipends of $4,500.00 each as research associates and a M.Sc. candidate receiving $3,600.00 as a research assistant.

Travel expenditures for the year included one round trip to India in March 1970 with stops in Spain and England while going and returning at no additional airfare cost. The purpose of the trip to India was to finalize arrangements for graduate student research and to obtain soil samples for analytical determinations here at Ohio State University. Stops, in transit, in Spain and England were for purposes of visiting the Agronomy facilities of the University of Madrid and to consult with Dr. John Coulter, specialist in tropical soils, at Rothamsted Experiement Station. Local travel during the year included trips to Washington, D.C. and Detroit, Michigan to attend the annual meetings of 211(d) professors and the American Society of Agronomy.

Miscellaneous expenditures were for shipping soil samples from Inida, for printing of promotional materials for the five week course on the utilization of soil-plant-water resources for increasing world food production. Additional expenditures for promotional material for the five week course were absorbed by the College of Agriculture and Home Economics.

Costs for Professor Russell's participation in the international seminar are not reflected in the '69-'70 expenditures. These will appear in the '70-71 figures.

Work Plan and Budget Forcast

Expenditures in the catagories of salaries and graduate student stipends are expected to remain fairly constant for the next year. Increases in expenditures for equipment involving the construction of a special fume hood for silicate analysis of soils, is expected.

In 1971 two graduate students will be traveling to India for purposes of continuing their research work. This will involve additional expenditures for travel and cost of living while in India.

Other increases in miscellaneous expenses are expected for (1) bringing to the campus one of the speakers involved in the five week course (2) additional library acquisitions and (3) purchase of small items for research work.

The projected budgetary requirements for the coming year are therefore as follows:

Salaries and retirement	$20,200.00
Graduate Students' stipend	12,600.00

(cont'd)

Equipment	$ 500.00
Miscellaneous	2,000.00
Travel and Living allowances	4,500.00
Total	$40,800.00

Work plans for the '70-71 period include a continued teaching and research effort on the part of the 211(d) professor and graduate students traveling to India will be accompanied by the professor in order to get them started on their research programs.

During the Spring Quarter 1971 a seminar course on International Development is being planned. This will be a multi-disciplinary seminar utilizing the faculty of the university who are actively engaged in internationally oriented research teaching and administration, or who have recently returned from such assisgnments. This is an effort to draw upon the experience and expertise of the faculty that is being generated by all university international involvement and to maintain the interest developed by the pending five week course.

For the last 2 years of the grant, the total projected total expnediture is:

1971-72	$56,970.00
1972-73	$50,900

Increased expenditures for these years reflects the additional costs of graduate student training.

THE PENNSYLVANIA STATE UNIVERSITY

COLLEGE OF AGRICULTURE

DEPARTMENT OF AGRONOMY

June 1, 1969 to May 31, 1970

ANNUAL REPORT FOR THE PERIOD ENDING MAY 31, 1970

211(d) INTERNATIONAL PROGRAM IN CROP MANAGEMENT
AGRONOMY DEPARTMENT, THE PENNSYLVANIA STATE UNIVERSITY

UNIVERSITY PARK, PENNSYLVANIA 16802

SUMMARY

The personnel involved in the 211(d) Program at the Pennsylvania State University were very active during the past fiscal year. Mr. Michael L. Colegrove, Graduate Assistant, spent six months in India establishing a phosphorus fertility study. Dr. Richard H. Cole, Associate Professor of International Agronomy, was assigned to the project on January 1, 1970 and traveled to Maharashtra State in February to familiarize himself with the production problems and research being conducted in the area. Mr. Wayne L. Haag, a second doctoral candidate, joined the program during the year. Two other graduate student candidates are presently being considered.

The 211(d) Program has stimulated a consideration of the importance of international development in both graduate and undergraduate programs in Agronomy at the University. The 211(d) students and professor have been meeting on a weekly basis with Indian students supported by USAID India funds at the University. This association has proved beneficial to both groups. The possibility of obtaining an internship following completion of advanced degrees is being considered. The feasibility of offering an undergraduate option in International Development within the Agronomy major is being discussed by the Courses and Curriculum Committee in the Department.

The effects of the Program on departmental research will have to be evaluated in the future. Many of the faculty are presently considering how they can expand their project objectives to provide answers to problems of international scope. New projects involving crops of minor importance in Pennsylvania and major importance in India have been proposed. The shortage of growth chambers at the University to conduct research under environmental conditions similar to those found in India should be rectified in the future.

The need to improve the research facilities in India is well recognized. Adequate field plot equipment is not available at the locations where 211(d) participants could be expected to work in the future. Laboratory facilities are presently not used or inadequately supplied. Greenhouses are not used efficiently because of indequate temperature controls. It is hoped that outside funds can be found to encourage improving these facilities in the future.

The Pennsylvania State University has been improving its capability to render assistance in developing countries at a rapid pace. The assistance of Dr. Clarence S. Bryner, Professor of Agronomy Extension and former member of Penn State's USAID Production Team, has proved extremely helpful. He has provided several seminars at the University and spoken to many farm groups. Dr. Bryner recently prepared a half-hour television special for educational television. Dr. Roger Pennock, a member of the Agronomy faculty and the Agricultural Production Team in India, has been a strong motivating force contacting both faculty and students during his home leave in the spring of 1970. Mr. Colegrove, of the 211(d) team, is directing his attention to stimulating fellow students to consider careers in international agriculture. The 211(d) professor has been responsible for encouraging this participation and has been involved with a group of professors at the Pennsylvania State University interested in modernization in developing countries.

It appears that the 211(d) Program will be successful in providing an opportunity for graduate students to obtain experience involving problems relevant in developing countries and increasing the pool of scientists interested in assisting with agricultural development outside the United States. It is also stimulating the interest of agronomists in international assignments and careers, as well as informing them of the production problems important in India. The effectiveness of the project in encouraging youth to seek training leading to careers in international agriculture and in increasing the participation of the Agronomy Department at the Pennsylvania State University in international programs, will be evaluated in future years.

1. Grant Objectives

   The major objectives of the 211(d) Program at the Pennsylvania State University are as follows:

   1. To increase interest in and knowledge about agricultural problems of India and improve the capability of the Pennsylvania State University to become associated with international programs in grain crop production and management;

   2. To increase the pool of scientists interested in and capable of assisting in agricultural development outside the United States;

   3. To provide an opportunity for graduate students to obtain research experience in grain crop production and management involving problems relevant to India;

   4. To create an awareness and stimulate interest of crop scientists in international assignments and careers; and

   5. To encourage youth to seek training leading to careers in international agriculture.

11. Major Accomplishments

Mr. Michael L. Colegrove 211(d) graduate assistant, expanded his Ph.D. research studies on phosphorus fixation in soils by establishing a sorghum fertility trial at Poona, Maharashtra State in India during the fall and winter term of 1969-70. Since Mr. Colegrove was the first student to go to India in Penn State's 211(d) Program, difficulty was experienced in obtaining a site for the experiment as well as supplies, plot equipment, farm equipment, irrigation, and labor. The absence of a formal cooperative agreement between the Pennsylvania State University and an Indian University was apparently one of the major problems. No 211(d) professor was assigned to the project at this time. Labor was available only from a local village. A serious problem was encountered with insects at this location. Although an effort was made to remove all the insects from the sorghum plants by hand, rather severe crop losses were obtained.

The experiences of this involvement not only increased the research competence of Mr. Colegrove and his advisors, but were utilized to enrich the faculty and graduate students at the Pennsylvania State University during seminars and private discussions. Mr. Colegrove traveled a limited amount in India improving his ability to consult on agronomic problems in the country. He has used this information in one presentation at an elementary school in an agricultural community near State College, Pennsylvania in an effort to encourage youth to consider international careers. This type of activity will be expanded in the future.

Mr. Wayne L. Haag, a former Peace Corps employee and M.S. Candidate at Michigan State University, accepted a graduate assistantship during the 1969-70 project year. He has been enrolled as a full time student since September, 1969 taking the maximum course load for a graduate student. A thesis topic will be selected within the next month and preliminary Ph.D. thesis work started at University Park this summer. Mr. Haag will be prepared to go to India during the spring of 1971.

An additional M.S. candidate and a Ph.D. candidate will be recruited during the summer of 1970 if possible. While candidates are available it is difficult to find students both academically qualified and sufficiently motivated to go into international work.

Two Pennsylvania State University Agronomists were involved with the USAID Production Team in India during the past year. Dr. Roger Pennock visited the University while on home leave and arrangements were made for him to present seminars, participate in classes and talk to the undergraduate Agronomy Club about the problems involved in agricultural development and his experiences in India. Dr. Clarence S. Bryner returned to full time work as Extension Agronomist during the year and has presented several talks to farm groups

throughout the state. This has been helpful in explaining to our people the reasons for the University's involvement in international problems and in justifying the need for continuation of USAID programs.

The competence of two faculty members has been increased by their participation in the National Grassland Council Meetings in New Zealand and Australia this past spring. Dr. John B. Washko, a major contributer to the meetings, traveled on Council funds. Dr. John E. Baylor attended the Meetings while on a 6-month leave studying forage crop production and management in the two countries. The expertise of both professors will be utilized to further the objectives of 211(d) in the future.

In February of 1970, Dr. Richard H. Cole traveled for a month in Maharashtra State in India. The purposes of this trip were as follows: (1) To acquaint the 211(d) professor with the major grain crop production and management problems in Maharashtra; (2) to review the grain crop research being conducted in the state; (3) to determine locations where cooperative grain crop production research could be conducted in Maharashtra State; and (4) to study the present higher educational system in the state. The work being conducted by Mr. Colegrove was also reviewed at that time. It appears that the best location to send students at present would be to Poona College, a constituent college in the Mahatma Phule Agricultural University. Several excellent problems were suggested by the Indian Scientists and a cooperative agreement could be established in the future.

During the spring term of 1970 a weekly international agricultural development seminar was held for those students involved in the 211(d) international Agronomy Program and the Indian students enrolled in agronomy at the University. While this is a small group, the topics have proved interesting and mutually beneficial to all those involved. The students have suggested that we expand this group during the fall term.

Seminars discussing Indian agricultural research and education have also been presented in the regular agronomy seminar series attended by the departmental staff and graduate students. The seminar presented by Dr. Roger Pennock, USAID/APP Team in Poona, was attended by many visitors and created an awareness of the problems and benefits of international assignments.

Dr. Cole was called on for many other internationally oriented assignments during the year. Counseling with students, other than those involved in 211(d) and the Indian USAID participants, was common. The 211(d) students were also involved in advising other graduate students about courses of international interest. Both the 211(d) students and the 211(d) professor were involved in consulting on problems of an international nature because of their previous experiences before entering this program.

The 211(d) professor has also participated in a multi-discipline University Professors' Committee interested in the "Process of Modernization in Less Developed Countires". This Committee, chaired by Dr. Howard B. Leavitt, the University Coordinator of International

Development, is presently considering new ways the University should be involved in development and methods of cooperating across departmental and college lines. Seminars have been planned and outside resource scientists invited to participate.

The courses within the Department have been reviewed by the 211(d) staff to determine their relevance to international aspects of agronomy. The lack of a tropical crop production course at the undergraduate level will be alleviated by the initiation of an introductory course in Plant Science during the 1970-71 school year. Advanced Field Crop Production taught by Dr. Robert P. Pfeifer, a professor with considerable international experience, has been revised and includes problems relevant in developing nations. Dr. John B. Washko, professor in grassland management, will be in a position to add an international dimension to his course after his trip to New Zealand and Australia this past spring and because of his involvement as faculty advisor to one of our Indian students in the Department. Since no tropical soils course is offered in the department, this void will be filled by individual studies involving 211(d) participants and interested faculty. It should be pointed out that the internationally oriented students have requested additional information about research station management and the design and operation of laboratory, greenhouse, and growth chamber equipment and facilities.

Plans are being made for an orientation course for future Indian Participants by the Coordinator of International Agricultural programs. This course will draw upon Dr. Richard H. Cole as a resource person and interested Agronomy Graduate Students as well as past Indian Participants.

A Rural Transformation Program is being established within the College of Agriculture under the coordination of Dr. Robert H. McAlexander. This Program is designed to facilitate and encourage interdisciplinary research and teaching in International Agricultural Development. Undergraduate and graduate courses in development are planned as well as research in the processes of agricultural development. The 211(d) professor will participate in this Program and the 211(d) graduate students will be encouraged to elect courses initiated under the program.

Graduate students in the 211(d) Program are encouraged to participate in courses outside the Department of Agronomy and related technical fields. For example, one 211(d) student has taken for credit in economics courses involving "Economic Growth in Underdeveloped Areas" and "Land and Water Resource Policy", as well as "South Asian Governments" in political science.

It is difficult to enumerate all the accomplishments of a new program such as 211(d). As more students and faculty become involved, the impact of the 211(d) Program can be more adequately evaluated.

III. Expenditures

The five-year budget and expenditures through November 30, 1969 were as follows:

Categories	Five Year Budget	Cumulative Expenditures
Salaries and Wages	$146,000.00	$ 9,640.00
Travel and Transportation	21,000.00	1,296.00
Equipment and Supplies	22,000.00	1,069.46
Other Direct Costs	11,000.00	105.90
Totals	$200,000.00	$12,111.36

This is significantly less spent than the amount expected based on the original budget, primarily because of the absence of a 211(d) professor for a major portion of the granting period and the need to finalize precise future plans before equipment and supplies are purchased. The travel expenditures do not include approximately $4,000 for travel to be charged to the project at a later date.

Two trips to India were made by the Penn State 211(d) staff during the past fiscal year. Dr. Richard H. Cole was in Maharashtra from February 25, 1970 to March 30, 1970. He reviewed the research and educational facilities in the state in order to determine where cooperative grain crop production research could be conducted and where 211(d) students could be placed in the future. The cost of trip excluding air fare was $834.46. Mr. Michael L. Colegrove arrived in India September 25, 1969 and departed February 28, 1970. He conducted a portion of his thesis work at Poona during this period at a total cost excluding GTR Travel of $3,203.06.

Equipment purchased costing in excess of $100.00 includes the following: a constant temperature water bath, cost $595.00, obtained from Fisher Scientific Company for phosphorus determination; a shaker, cost $338.00 obtained from Arthur H. Thomas Company for phosphorus determination; and a desk, cost $107.58, obtained from All-Steel Equipment Co. for the 211(d) professor.

. Work Plan and Budget for Next Year:

The proposed budget for the next fiscal year is as follows:

Categories	1970-71 Budget
Salaries and Wages	$33,000
Travel and Transportation	4,000
Equipment and Supplies	10,000
Other Costs	3,000
Total	$50,000

The phosphorus fertility studies on sorghum initiated in 1969 at Poona, Maharashtra State in India and University Park, Pennsylvania will be continued in 1970 and the data utilized by Mr. Michael L. Colegrove in his Ph.D. thesis research. This work will become part of a thesis to be completed by the Summer Term of 1971.

Two new research projects will be initiated at The Pennsylvania State University in 1970. These projects, involving crop production and management of sorghum and soybeans, will provide objectives that are designed to solve problems common to both crops in India and Pennsylvania. Thesis proposals of 211(d) students will contribute to the solution of problems identified in these projects. Two students should be in a position to travel overseas in the spring term of 1971 to conduct a portion of their thesis work in India. Two additional students should start their course work during the next year and be prepared to go to India in 1972.

Several equipment purchases will be required in the fiscal year. Field plot equipment is needed to facilitate the planting and threshing of crops both in the United States and India. Additional laboratory and growth chamber equipment will be purchased to facilitate the handling of seed germination and emergence tests as well as the proposed ecological studies.

The 211(d) staff will continue to work closely with the Indian students studying agronomy at The Pennsylvania State University. The need to elect agricultural development courses within the programs of both undergraduates and graduates will be emphasized. Seminars involving staff members that have worked in India will be encouraged as a part of the regular organized seminar series. When international assignments are available an effort will be made to find qualified staff desiring to participate.

Dr. Richard H. Cole will attempt to find scientists in an Indian university interested in cooperating on the proposed graduate student research projects. The success of the program during the next year will be partially dependent on the ability of the 211(d) staff to make a workable agreement for cooperative research and to pursue the work to a satisfactory completion. If this can be accomplished, the involvement of agronomists at The Pennsylvania State University in internationally oriented agricultural education will be significantly accelerated.

The projected expenditures for future years of the project are as follows:

1971 - 72	$60,000.00
1972 - 73	$53,000.00

UNIVERSITY OF TENNESSEE

COLLEGE OF AGRICULTURE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

June 30, 1969 to July 1, 1970

SECOND ANNUAL TECHNICAL REPORT
July 1, 1969 - June 30, 1970

AID/Section 211(d) Institutional Grant
University of Tennessee
AGRICULTURAL ECONOMIC ISSUES IN INDIA

Summary

This year the Tennessee/211(d) focus was on catalyzation of campus-side action--(a) addition of a graduate major and two new courses related to agricultural development; (b) more interaction among agricultural faculty and students with interests in India and other developing countries through informal workshops, debriefing sessions, and a new International Agriculture Seminar series; (c) accelerated effort to help undergraduates in agriculture to become acquainted with international development problems and career opportunities; and (d) arranging graduate study programs and financing help for additional students with career interests in the economics of agricultural development. Beside strong involvement in these activities, the 211(d) professor taught four courses and was advisor to several graduate students.

The first 211(d) Fellow completed an M.S. thesis related to agricultural credit in Mysore State and is planning to go there by October 1970 for Ph.D. dissertation research. In September 1970 three new students are slated to begin graduate work in agricultural economics under 211(d) fellowships, and a fourth student with Ph.D. studies already in progress will probably be shifted to 211(d). Two other Americans with strong international development interests expect to continue under Department funding and one will begin graduate study under an NSF fellowship. All of the latter seven have had previous experience abroad with the Peace Corps.

Though no one went to India this year under 211(d) auspices, faculty and students in the Department have tried to keep in touch with its problems and progress through returning Tennessee/AID contract team members and short-term consultants, AID Participants and other visitors from South India, correspondence, and library acquisitions. There has been some direct contact by the Department through one of its faculty members, Dr. M.B. Badenhop, who has been on two short-term assignments with the contract team in the summers of 1969 and 1970.

The 211(d) Professor's work in 1970-71 will include a trip to India to help the first 211(d) Fellow with his research and to explore other problems areas, assistance to the new 211(d) Fellows and other graduate students in planning course programs and thesis research, teaching and improvement of the two new courses, a start on writing educational materials stemming from these two courses and the India work, and reinforcement of efforts to generate more interaction among faculty and students with international concerns and experience.

Overall Progress Toward Grant Objectives

This 211(d) grant was made to help the University of Tennessee accelerate its efforts to strengthen competency to deal with the economics of agricultural development in India and other countries, and to establish this area of specialization as a legitimate and continuing function of the University. Attention was directed especially to graduate instruction and research in the Department of Agricultural Economics and Rural Sociology. The 211(d) funding has enabled the Department to add an International Professor (Dr. David W. Brown), several graduate study fellowships for students who want to follow international service careers, opportunities for these students to gain field research experience in India, and other activities which would not be possible for the University to undertake through its own resources. Anticipated outgrowths of this effort are: increased capability in agricultural economics and related fields to reinforce the University's assistance work in India and other developing nations; greater awareness among students and faculty of the problems of international aggicultural development and commerce; increased interest among college students in preparing for international service careers with public or private entities; better opoortunities at the University to prepare for such careers through the study of agricultural economics; and an increased pool of young agricultural economists who are qualified to work with development programs in India and other nations.

Emphasis during the first year (1968-69) was on establishment of informal contacts in India, identification of problems in South India that agricultural economists will need to tackle, review of teaching and research programs at the University, and jelling of ideas with colleagues and administrators about improvements in international agriculture activities that could be catalyzed with 211(d) help.

The second year has stressed implementation of campus-side improvements (curricula, stimulation of greater interest and interaction among students and faculty); selection of appropriate students for 211(d) fellowships; the intensified counseling of American and foreign students with interest in the economics of agricultural development. Emphasis has been on meshing such activities in with other concerns of the College of Agriculture and the University-wide international dimension, rather than walling off 211(d) work as an isolated program.

Now that a good start has been made on setting the campus-side stage, the 211(d) Professor during the remaining there years will concentrate more on the subject matter itself--improving course content, preparing students for specific lines of research that link together and to Tennessee/AID needs in South India, working with the students on this research, and developing educational materials in collaboration with Indians. Attention will also be given to effective placement of 211(d) Fellows who complete their graduate studies, and location of funding sources to enable future students with career international interests to undertake similar programs of study and overseas research.

Specific Accomplishments During 1969-70

1. Teaching Curricula Improvements

A new Ph.D. concentration in the Economics of Agricultural Development, as well as a graduate minor in Rural Sociology, was proposed this year and by Spring 1970 had received all the needed approvals. This provides more flexibility in meeting the needs of students with development interests, including those majoring in other departments.

At the same time two new courses of special relevance to development students were approved:

Ag. Econ. 4250, Agricultural and Rural Program Planning. (This is aimed at agricultural students who will be involved with extension, research and action programs at operational levels. Will include informal sessions with persons who have been administrators and advisors with such programs.)

Ag. Econ. 6210, Agricultural and Rural Transformation Problems. (This seeks to help advanced graduate students in agricultural economics bring their theory and analytical tools to bear on real problems, using a workshop approach.)

These courses are being taught for the first time by the 211(d) Professor during the Summer 1970 term.

During the year the 211(d) Professor taught a graduate seminar in agricultural policies. He also coordinated the biennial honors seminar course in which 23 of the top agricultural juniors and seniors participated by invitation. Problems of international agricultural development, assistance and commerce received considerable attention in both courses.

Efforts by the 211(d) Professor to pass along materials on international development topics to other faculty in agricultural economics and related fields have continued. A spirit of mutual interchange has evolved among several professors, and a number of "non-international" courses are known to have important components which deal explicitly with world agriculture.

In Fall 1969 under a special 211(d) "workship" arrangement, an agricultural economics graduate student (Glenn Ames) prepared a 30-page compilation of recent facts and figures related to international agriculture, world food, and foreign aid. It was reproduced and distributed to various persons on campus for use as a ready source in connection with teaching, extension talks, and other needs.

2. Graduate Students and Research Work

Among the 45 graduate students in the Department this year, 10 were from developing countries under AID, FAO, A/D/C, and other auspices. In addition, three American students were returned Peace Corps Volunteers. These students have added much to the breadth and richness of background represented in the Department. In working with these and other students with international interests, there has been close interaction between Dr. Brown and Dr. Badenhop (who has more than six years' experience in India), and the general practice is for either or both to serve on their advisory committees. Dr. Brown has served as major advisor for seven graduate students this past year.

Parker Cashdollar, the first 211(d) Fellow, completed M.S. degree requirements in January 1970. His thesis was "Some Considerations in

Design of Agricultural Credit Programs in Mysore State, India." This study, though conducted in Knoxville on the basis of secondary information, served as a means of acquainting him with Indian agriculture and suggests a framework for further analysis along this line in Mysore. Mr. Cashdollar has recently passed his Ph.D. prelims, and is planning to be in India from four to six months, starting around September, to do dissertation field research. Arrangemtnts are being made for him to cooperate with agricultural economists and a group of Indian M.S. students at Mysore University of Agricultural Sciences. This group, led by Professor R. Ramanna and A/D/C Visiting Professor Donald Taylor, is currently undertaking a multi-faceted study of agricultural change in the Tungabhadra irrigation program area. Mr. Cashdollar will probably focus on analysis of farm adjustment potentials in one or more areas within the region and their implications for future credit and input supply systems.

By June 1970, 211(d) fellowships had been offered to and accepted by three students who plan to begin graduate work in September. All will have completed Peace Corps assignments abroad--George Smith, Ecuador and Bolivia; Robert Thurston, Venezuela; Thomas Vollrath, Upper Volta. Mr. Smith will be starting at the Ph.D. level, and the others at the M.S. level.

One student who came to the Department last Fall, Glenn Ames (previous experience in Venezuela and Peru), will probably be shifted to 211(d) in September. For his first year of Ph.D. study, the Department Head was able to help him obtain an NDEA Fellowship.

For two other students who came in 1969 and who have strong international career interests (Mike Fuchs-Carsch and John Anania, with Peace Corps experience in Kenya and Mysore State, India, respectively) the Department has provided finincial support through Agricultural Experiment Station assistantships and workships.

In September 1970 Mrs. Ellen Gouin, who has been living in Upper Volta following Peace Corps service there, will begin M.S. work under an NSF Fellowship that was arranged through the Department Head. Her husband, Rene Gouin, is a French citizen who has been in agricultural development work in Upper Volta and will also be taking graduate studies in the Department. Some financial help from University sources is being arranged for him too.

An eighth student who has come to the University as an outgrowth of contacts made through the 211(d) Professor is Anthony Griffin, a former Peace Corps Volunteer in Colombia. He is well toward completion of M.S. studies in agricultural extension with supporting work in agricultural economics and rural sociology. Mr. Griffin has accepted a position at the University of Tennessee as Associate Director of International Student Affairs, starting September 1970.

For more complete information about the backgrounds of the 211(d) Fellows and the other students mentioned above, see Attachment A. There are additional American students in the Department who have ancillary or emerging interests in development and world agriculture, and who are participating in courses, special seminars, and other activities related to this area.

The two AID Participants from Mysore in the Department will be doing their Ph.D. dissertation research this coming year. Mr. A. N. K. Murthy, under the direction of Dr. Badenhop, has begun a study of emerging food grain marketing needs in Mysore, with emphasis on the regulated markets system. Noel Rebello is working under Dr. Brown and is still in the process of firming up a topic. One proposal being considered would relate to projection of future input needs for selected areas of Mysore, building from farm-level adjustment information. Another possibility would be a multi-country review of development program evaluation approaches, with a view toward suggesting techniques for appraising the impacts of the Tungabhadra irrigation scheme. This later topic would link to the studies of Mr. Cashdollar and the MUAS group mentioned earlier. For both students, not being able to return to India to obtain data firsthand presents real problems. Some help along this line may be provided by Dr. Badenhop during his short-term assignment in Mysore this Summer, as well as by Dr. Brown, who plans to be there for a few weeks in September or October.

Two theses which relate to international development were completed by foreign students in the Department this year. One was on factors influencing cocoa prices in Brazil. The other dealt with improvement of agricultural cooperatives in Iraq. This Summer an A/D/C student from Malaysia plans to do a thesis on alternatives in design of land settlement schemes of that country, under the direction of Dr. Brown. Analysis of the 1968 land tenure survey in the Dominican Republic continues. A Ph.D. dissertation based on the joint work with the Oak Ridge National Laboratory related to development of agro-industrial complexes in the Near East was completed this year. Several students and faculty members in the Department have been working on studies related to rural-urban adjustment, migration, and TVA impacts in the Tennessee region.

In anticipation of a renewed Extension Service-Experiment Station thrust in this direction, the Department has been discussing possible ways to intensify attention to critical rural development problems and opportunities in Tennessee. The 211(d) Professor has taken an active part in this, as it is felt that such work could well have close conceptual ties to development work abroad.

For the first time in several years, staffing of the Department was brought to full strength with the filling of four vacancies by early 1970. All of these four men have recently, or have nearly, completed Ph.D. degrees--Ray Daniel and Ben McManus from Purdue, Frank Goode from Minnesota, and Billy Trevena from Tennessee. They will be involved in teaching and research related to policy, finance, marketing, production economics, land and water resource development, and quantitative methods.

3. Other Activities for Strengthening International Competencies Aided by 211(d)

Special seminars and discussions. During the year there was a consious effort to increase the amount of interaction among faculty and students in the Department and the Institute of Agriculture about world agriculture through special siminars, debriefings, and research brainstorming sessions. Particular emphasis was placed on emerging programs and problems in southern India, through presentations by University staff who had returned or were on home leave from assignments with the Tennessee/

AID contract team there, as well as by Indian officials and technicians who were in Knoxville on special study programs. Additional sessions related to various regions of the world drew upon the experiences of students, faculty, and special visitors to the agricultural campus.

During the earlier part of the year these discussions were largely in the context of an "India Research Brainstorming" series organized by Professors Brown and Badenhop. Since Spring 1970 informal seminars related to India and other development situations have been arranged through the newly formed Committee on International Agriculture described below. The initial aim of this Committee was to help agricultural undergraduates with potential interest in international service to "rub elbows" with faculty and other students who have overseas experience. However, as things have emerged these sessions also (a) enable faculty and students who have been abroad to share and analyze experiences with one another, (b) provide Indian Participants with some comparisons with agricultural development problems in other countries, and (c) acquaint Institute of Agriculture staff who have not yet been abroad with the work of Tennessee and others in international development. Participation has usually included persons from several departments, and has ranged from 10 to 40, and in two instances the entire agricultural research staff.

International agriculture seminars many of which the 211(d) Professor helped to plan and publicize in cooperation with the Director of International Agricultural Programs included this year the following:

India Research Brainstorming Series (arranged by D. W. Brown and M. B. Badenhop)

July 28 — Dr. M. B. Badenhop, Professor of Agricultural Economics: Findings of his 3-month study of food grain marketing problems in Tamil Nadu State.

Aug. 8 — Dr. M. B. Badenhop: Implications of his Tamil Nadu findings for further research by Indian Participants and 211(d) students.

Sept. 10 — Mr. Parker Cashdollar, 211(d) Fellow: Review of his M.S. research proposal related to agricultural credit programs in Mysore State.

Oct. 15 — Mr. A. N. K. Murthy, USAID Participant: Review of Ph.D. research proposal related to improvement of food grain marketing systems and regulated markets in Mysore State.

Oct.28 — Dr. W. D. Bishop, Associate Dean of Agricultural Extension: Observations on possible improvements in soil testing programs in Mysore State, and effective approaches to short-term consulting work, based on his 3-month assignment in India.

Feb. 26 — Professor Ralph Ramsey, Rural Sociologist, Tennessee/AID Team: Challenges and opportunities at Mysore University of Agricultural Sciences for the returning Participant.

Feb. 27 — Professor Ralph Ramsey: Some thoughts about social science research needs and methods in the agricultural development of Mysore.

Committee on International Agriculture Series (L. N. Skold, Chairman)

Apr. 3 — Informal evening discussion at the home of Professor Skold for students, Indian Participants, Peace Corps returnees, and certain faculty to discuss recent developments in India and interest in continuing seminar series related to world agriculture.

Apr. 20 — Dr. Frank Bell, Professor of Agronomy: Observations from his 3-month assignment related to improvement of soil management teaching at the Mysore University of Agricultural Sciences.

May 4 — Dr. Frank Woods, Professor of Forest Ecology: Experiences related to shifting agriculture in the Upper Amazon Basin.

May 15 — Informal evening discussion at the home of Dr. Brown to compare Peace Corps experiences of Steve Jefferies in Bolivia, Jim Rugh in Senegal, and Glenn Ames in Venezuela.

June 4 — Mr. Tom Langford, Leader, Tennessee/AID Agricultural Production Promotion Program in Mysore State: A review of recent developments in the APP Program.

June 12 — Mr. Gist Welling, Deputy Group Leader, Tennessee/India Agricultural Programs: Recent advances in agricultural university development and extension activities in Mysore State.

Other Inter-Departmental Sessions Related to World Agriculture

Oct.2 — Drs. Max Springer and Henry Fribourg, Agronomy Department, and Dr. M. J. Montgomery, Dairy Department: Agriculture in Puerto Rico. (Experiment Station seminar.)

Oct. 10 — Drs. D. M. Thorpe and Martin Weeks, Tennessee/India Team: Progress and future plans of Tennessee's programs in India. (Arranged by Lewis Dickson, Director of International Agricultural Programs.)

Oct. 22 — Dr. Horace J. Davis, Assistant Administrator, Foreign Agricultural Service, U. S. D. A.: Challenges in foreign agricultural service. (Arranged by O. E. Goff, Head, Poultry Department.)

Nov. 7 — Dr. Milton Barnett, A/D/C Associate in Rural Development, Malaysia: Some observations about recent transitions in Southeast Asia, and possible contributions of university agricultural and social scientists to international development efforts. (Arranged by D. W. Brown.)

Feb. 5 — Dr. John Ewing, Dean, Agricultural Experiment Station: Observations on the progress of agricultural research in Mysore State, India. (Experiment Station seminar.)

Feb. 12 Dr. William H. Nicholls, Latin American Studies Director, Vanderbilt University: Agricultural frontiers in Brazil. (Sponsored by the Department of Agricultural Economics and Rural Sociology.)

In addition a number of faculty, students, and outside resource persons gave talks related to world agriculture as part of on-going departmental seminar series and student club programs on the agricultural campus.

Accelerated efforts to reach agricultural undergraduates. As an unanticipated outgrowth of previous contacts with the 211(d) Professor, the Director of International Education, and others, this Winter the Peace Corps approached the Institute of Agriculture about a possible "Intern" program under which interested students would be prepared for agricultural development assignments in South India. There did not turn out to be enough interested upperclassmen to go ahead with this, in the immediate future at least. However, exploration of this proposal by the 211(d) Professor and others disclosed that a number of agricultural undergraduates had been thinking about Peace Corps or other international service.

As a means of providing such students with special counseling and opportunities to interact with others on campus who have experience abroad, the Dean of the College of Agriculture established a Committee on International Agriculture on a trial basis. This is initially being chaired by Professor Laurence Skold, who was with the Tennessee/India program for six years and who has been allotted time during the Spring and Summer of 1970 to spearhead discussions and other helps to students with latent international interests. Other current Committee members include Drs. Badenhop and Brown, Dr. Frank Bell in Agronomy; Dr. Frank Woods in Forestry; and Mr. James Rugh, a student who has extensive experience in India.

Although its concern with helping students continues to be central, the Committee is also emerging as the vehicle on the agricultural campus through which other special discussions related to international development are organized. Additional seminars and debriefing sessions for staff and students are being planned for the coming year. Thought is being given to a possible one-credit problems course in the Winter or Spring for underclassmen who would like to learn more of what international development and assistance is all about. In addition, it is expected that the Committee members will continue to be consulted by individual students and their advisors about overseas service or job opportunities and course electives that might be useful in preparing for such work.

University self-study. During the Winter the Department initiated a comprehensive review of future teaching and research directions, a process which has involved considerable thinking and interaction among faculty members. International development was seen as one of the areas to receive continuing priority. Even though emphasis will be on India, it was felt to be desirable to have students in the Department from

various countries and to encourage occasional faculty involvements in several places in years to come. Rather than walling off the international dimension as an isolated activity, it was felt that teaching and analysis related to overseas and domestic development problems could be productively intermeshed in a number of ways.

This Department review, in turn, has fed into a University-wide self-study being conducted during the Spring and Summer of 1970. In committee discussions and faculty-student opinion surveys considerable attention is being given to work with international students and overseas activities.

In addition to work on the Department review, the 211(d) Professor is a member of the campus-wide committee on administration and organization.

Library materials. The special India section of the Agricultural Library has continued to grow and be actively used. More than 200 books and special reports of relevance to the work in South India were added during the year on the basis of suggestions made by Professors Brown, Badenhop, and Skold. Grant funds are not being used for these acquisitions. In addition, a number of useful items have been provided by the Director of International Agricultural Programs, the Tennessee Party Chief in India, and other team members there. The Agricultural Librarian and his staff have provided much help in organizing and maintaining this collection. Dr. Brown and the Agricultural Librarian have also been working together on a selective buildup of reference materials related to international agriculture and development.

Special arrangements for foreign students. The 211(d) Professor helped several foreign students to arrange for special between-term study and travel programs. Among others, these included participation by two students in a new travel study course related to agriculture in the Tennessee region, a visit by six foreign agricultural economics students to the Tennessee Corp Reporting Service in Nashville, and special arrangements for several to observe nearby TVA and Extension activities. In making these local arrangements there has been especially helpful cooperation by the Director of the TVA International Visitors Center, the Head of the Department of Agricultural Extension, and the Extension Resource Development specialists.

Symposium participation. To help reinforce his teaching and research in international development, 211(d) funds were used to enable Dr. Badenhop to participate in the symposium of Food Production and Income Distribution in South Asia held in Manhattan, Kansas, in September.

Other activities in which the 211(d) Professor has been involved since July 1969 include:

...Prepared the committee report on possible CUSURDI contributions to long-range agricultural adjustment analysis (LRAAA) in India, and presented it to the Council members in July 1969.

...Served as a faculty advisor to the International House Program Planning Committee.

...Continued as Career Consultant in agricultural economics for the Peace Corps, in which returning Volunteers write for help in locating suitable programs of graduate study.
...Served as a member of a special University Senate Committee on evaluation of grading systems and academic standards, in which special needs of foreign students received some attention.
...Served as a member of the selection committee for the McClure Fellowships, which are awarded by Tennessee donors to outstanding students in the area of international affairs.
...Continued as a member of the campus Asian Studies Committee, which concentrated this year on establishment of an Asian Studies Program in the College of Liberal Arts.
...Prepared a radio tape on international development and assistance trends for distribution by the Institute of Agriculture to 70 stations in the Tennessee region.
...Met with several international visitors to the University and TVA, and arranged informal sessions in the office and home for some to interact with students and other faculty.

Related Developments on Campus

Overall attention to international students, curricular improvements, and overseas study and service opportunities has continued to grow on the University of Tennessee campus in modest, but healthy, fashion. This has been greatly aided by the Office of International Education, which was established two years ago, as well as by further strengthening of the Office of International Student Affairs this past year.

The Director of International Education, Dr. Nelson Robinson, has provided much informal support to the 211(d) Professor and others through such activities as generating better communication among faculty and students with international concerns, calling attention to resource materials and visitors of interest, helping to arrange for special off-campus speakers and symposia, and serving as a sounding board for ideas. Illustrative of activities that received the International Education Office's attention this past year are: (1) planning and approval of the Asian Studies Program in the College of Liberal Arts; (2) arrangements for students to participate in summer work projects in Venezuela and Colombia; (3) furthering of University and citizen involvement in the Tennessee Partners of the Alliance Programs in Venezuela and Amazonas State of Brazil; (4) more organized arrangements for informing and guiding students about overseas study and travel opportunities; and (5) inauguration of a new newsletter, Focus International, aimed at keeping faculty and students informed about the University's international dimension.

Under its new Director, Mr. Dixon Johnson, the Office of International Student Affairs has made good progress on a number of fronts. Of particular note are: (1) an improved program for orienting new international students, with active leadership provided by a group of interested American students called INTERCOM; (2) much increased use

of the International House (currently more than 1,000 student hours per week) as a vehicle for informal international-American student interaction, social events, discussions, movies, and trips to nearby points of interest; (3) organization of low-cost European travel opportunities for students and faculty; and (4) a new "Certificate of Participation" program to provide international students who have to terminate early for one reason or another with tangible recognition for their work at Tennessee. The number of international students on campus in any one term has been between 400 and 500.

As an outgrowth of earlier contacts made by the Director of International Education, the Institute of Agriculture is exploring the possibility of a contractual exchange-assistance arrangement with a regional development corporation in Venezuela. This would focus initially on improvement of forested land management systems, and would involve faculty and graduate students in the Department of Forestry. However, the overall scope of Venezuelan group is broader than this and, should Tennessee move into such a relationship, it could become a mutually productive outlet for students and faculty in other development specialities who wish to do research and gain experience abroad under other funding.

The Economics Department, in which agricultural economics students take much supporting work, has continued to strengthen its offerings in development and international economics. One professor, Dr. Walter C. Neale, has special interest in India, and one of his advanced seminars focuses on grassroots development in that country. In June, he completed a Spring Review Country Paper for AID, "Land Reform ir Uttar Pradesh, India.

Of possible interest to AID is the special report released in May by the University's Center for Business and Economic Research, "Growth and Change in Mexican Agriculture" by W. E. Cole and R. D. Sanders.

In the University there have been several course additions this year related to world affairs, foreign cultures, and development. Beside the two new agricultural economics offerings mentioned earlier, a new political science course, Comparative and Development Administration, should be of special interest to students in the Department.

Among the Institute of Agriculture staff and administrators there has been a significant increase this year in the number who have experience in India; six went to Mysore for the first time for short-term assignments with the Tennessee/AID contract team there, and four others returned to Tennessee following long-term assignments with the team.

The general picture in the Institute of Agriculture and on the overall Knoxville campus is that, while few departments as yet have many faculty and students with strong international concerns, there is in the aggregate a significant amount of interest and experience in a variety of problem areas and geographical regions. This suggests the desirability as the international demension further unfolds of placing considerable emphasis on activities, such as organized seminars, overseas research, assistance work, which are cross-disciplinary.

Expenditures to Date

Total 211(d) expenditures from July 1968 to June 1970 have been about $57,500--some $22,500 less than the $80,000 that had been projected initially. This is because most of the 211(d) fellowships will not begin until Fall 1970. With existing commitments, it appears that all of the carryover funds will be needed to complete the programs of these students during the remaining three yrars. No grant funds have been used for equipment. For more details of expenditures to date and projected patterns, see Attachment B.

Plans for 1970-71

The 211(d) Professor will continue to reinforce efforts in the Institute of Agriculture and on the campus as a whole to strengthen curricula, to generate closer interaction among relevant faculty and students in activities related to world agriculture, and to afford undergraduates with more opportunities to become acquainted with development problems and international service possibilities. But now that groundwork for such continuing emphases has been laid and to some extent institutionalized, he plans to devote more of his time this coming year to the subject matter of agricultural and rural development itself. Probably about half of Dr. Brown's time will be devoted to helping M.S. and Ph.D. students in planning their study programs, and conducting and writing up their research. He will be teaching the new courses related to agricultural and rural development planning during the Summer of 1970 and again during the Spring or Summer of 1971. He proposes during the year to start writing a series of interrelated monographs related to operational program planning. These would not only become core reading materials for the two courses in the future but would also hopefully be of use in teaching and in-service training in India and elsewhere. These teaching materials could also result in a more cohesive framework for blending together the results of previous research of the Department related to Tennessee and international development, as well as for identifying future research activities.

One other professor in the Department--Dr. Badenhop--will continue to be heavily involved in international work. He will return in late August 1970 from the three-month assignment in Mysore State to teach his two agricultural development courses and, jointly with Dr. Brown, will provide leadership of graduate study and research programs related to international agriculture. Most other professors in the Department will continue to have associations with foreign students, 211(d) Fellows, and others in the "development" group through membership on, or chairmanship of, graduate advisory committees, as well as through teaching contacts. A special effort will be made this year to involve the new faculty members in advisory work and research planning for these students.

As noted earlier, the first 211(d) Fellow (Parker Cashdollar) expects to go to India Fall and Winter 1970 for Ph.D. dissertation work in informal cooperation with the Mysore University of Agricultural Sciences. Dr. Brown is planning to be in Mysore for a few weeks at the beginning of this period to help Mr. Cashdollar opganize this work. This stay will also be used by Dr. Brown to obtain materials for the Ph.D. study to be conducted by Mr. Rebello in Knoxville, to firm up research plans for 211(d) students who will be ready in 1971 and 1972, and to obtain further background of emerging problems and activities related to his own work on operational agricultural program planning. No other trips to India under 211(d) auspices are anticipated during 1970-71.

Eight Americans with international career interests (seven with prior experience abroad) plan to begin or continue graduate study in the Department during the 1970-71 academic year. Five of these will be under 211(d) fellowships. By Summer 1971 the first 211(d) Fellow, Mr. Cashdollar, should be nearing completion of his Ph.D. dissertation and degree requirements.

A second will probably be taking Ph.D. prelims and preparing for dissertation research. A third will be mid-way in his Ph.D. course work. And the two other 211(d) Fellows should be well toward completion of M.S. degree course requirements and beginning their Master's thesis research, prior to continuing on for Ph.D. study. These M.S. thesis will be done on the Knoxville campus on topics related to international development.

With the wealth of cross-country experience represented among these students, as well as the several foreign graduate students who will be in the Department this coming year, a special effort will be made to provide more opportunities for exchange of ideas and buildup of analytical constructs through such vehicles as advanced seminar courses, special seminars, and informal sessions in faculty homes. Analytical interaction with faculty and students who are working on Tennessee rural development problems, as well as with persons who have developed interests and experience in other departments on campus, will be encouraged. Although there are no plans to use 211(d) funds for "outside" speakers, it is anticipated that there will be a number of opportunities for the 211(d) group to have contact with special visitors and lecturers who are concerned with international problems. The sizable number of senior-level persons from developing courtries who come to Knoxville to visit TVA represent a source of outside insight and stimulation that might well be tapped to a greater extent in the future, and there have already been efforts by several on campus to facilitate this.

The number of students under 211(d) auspices will be at a peak in 1970-71. Accordingly, grant expenditures are expected to be at the highest level of the five-year period...about $57,000. (See Attachment B.) It will be necessary to taper down expenditures during the final two years of the grant period in order to keep within the authorized total. Projections are that it will not be possible to take on any additional graduate students under the 211(d) grant beyond the five to whom commitments have already been made.

The Department has received inquiries from several additional students who want to prepare for international careers under a 211(d)-type program, and there is a desire to accommodate a modest number of such students in years to come. It may be possible to arrange Experiment Station assistantships, NDEA or NSF Fellowships, or other financial helps for one or two each year, but these kinds of sources would not enable students to gain analytical experience abroad. So, with these needs and capable students in mind, the Department Head and the 211(d) Professor will endeavor this coming year to look for student-assistance sources to carry the 211(d) idea forward. At the moment, such prospects do not appear to be abundent.

Another area that will receive the 211(d) Professor's attention in 1970-71 is placement of the students who will be nearing completion of graduate work. Potential employers in educational and international development fields will be alerted to the names and qualifications of students who are coming along, and every effort made to help them find as productive outlets as possible.

Attachment A
1969-70 Tennessee 211(d) Report

BIOGRAPHICAL SKETCHES OF AMERICAN GRADUATE STUDENTS WITH CENTRAL INTEREST IN INTERNATIONAL DEVELOPMENT

Department of Agricultural Economics and Rural Sociology
University of Tennessee

AID/Section 211(d) Grant Fellows

Glenn C. W. Ames: Born 1942, New York. Married. B.S., 1964, Mansfield (Pa.) State College, social studies education. M.A., 1968, Northern Illinois University (Latin American history). Peace Corps Volunteer in community development and extension youth work, Venezuela, 1964-66. M.A. thesis on land settlement in Peru. Taught high school in Rochester, New York, 1968-69. Began Ph.D. studies at Tennessee in September 1969 under a 211(d) workship and, later, NDEA Fellowship. Will continue Ph.D. work under 211(d).

Parker D. Cashdollar: Born 1942, Tennessee. Married, 1 son. B.S., 1964, University of Tennessee, agricultural economics. County supervisor, Farmers Home Administration, 1964-68. Began M.S. and Ph.D. studies at Tennessee in September 1968, under 211(d). In January 1970 completed M.S. thesis, "Some Considerations in Design of Agricultural Credit Programs for Mysore State, India." Has completed Ph.D. course requirements, and plans to do dissertation research in Mysore, Fall 1970.

George F. Smith: Born 1941, New York. Married. B.S., 1963, University of Connecticut, agriculture. M.S., 1967, Montana State University, agronomy and international development. Peace Corps Volunteer in agricultural development, Ecuador, 1963-65. Administrator of AID/Montana summer training courses for extension workers from Ecuador, 1966-67. Agricultural advisor with the Peace Corps, Bolivia, 1967-70. Will begin Ph.D. studies at Tennessee under 211(d), starting September 1970.

Robert V. Thurston: Born 1943, Washington. Married. B.A., 1966, University of Oregon, political science. Two terms of graduate work and research related to Latin America, University of Oregon, 1967. Peace Corps Volunteer in land settlement, co-op development, and extension, Venezuela, 1967-70. Also has lived in Mexico. Will begin M.S. studies at Tennessee under 211(d), starting September 1970.

Thomas L. Vollrath: Born 1944, Missouri. Single. B.A. (hons.), 1967, University of the South, economics. Peace Corps Volunteer in agricultural extension and community development, Upper Volta, 1967-70. Will begin M.S. studies at Tennessee under 211(d), starting September 1970.

Students Under Other Funding

John R. Anania: Born 1936, West Virginia. Married. B.S., 1962, Youngstown (Ohio) State University, public relations. Commercial sales work, 1962-66. Peace Corps Volunteer in dairy and poultry development, Mysore State, India, 1966-69. Began studies toward M.S. at Tennessee in September 1969. Now holds an Agricultural Experiment Station workship related to rural sociology.

Michael A. Fuchs-Carsch: Born 1942, Poland (now a U.S. citizen). Married. B.Soc.Sc., 1966, Birmingham (England) University, economics. Commercial bank experience in Germany, 1962-63. Peace Corps Volunteer in national agricultural development planning, Kenya, 1966-68. Began studies at Tennessee in March 1969. Now writing M.S. thesis and has started Ph.D. courses, under an Agricultural Experiment Station assistantship.

Ellen A. Gouin: Born 1945, Arkansas. Married. B.A. (cum laude), 1967, Mt. Holyoke College, economics. Peace Corps Volunteer in health education, Upper Volta, 1967-69. Has continued to live in Upper Volta since then. Plans to start graduate work at Tennessee in September 1970 under an NSF Fellowship. (Mrs. Gouin's husband, Rene Gouin, will also take graduate study in the Department. He is a French citizen who has been in agricultural assistance work in Gabon, Senegal, and Upper Volta.)

Attachment B
1969-70 Tennessee 211(d) Report

ACTUAL AND FORECAST EXPENDITURES

	Expenditures to Date			Forecast Expenditures			Forecast Five-Year Total
	1968-69	1969-70	Sub-total	1970-71[b]	1971-72	1972-73	
Staff salaries and fringe benefits[a]	21,890	23,100	(44,990)	24,700	25,740	27,060	122,490
Graduate fellows							
Number	(1)	(1)		(5)	(3)	(2)	
Stipends	2,771	3,500	(6,271)	14,800	10,000	7,000	38,071
Other costs	2,786	3,400	(6,186)	17,500[c]	8,000	7,753	39,439
Sum of all items	27,447	30,000	(57,447)	57,000	43,740	41,813	200,000

[a]Includes the 211(d) Professor and part-time support of one secretary/clerk.

[b]As estimated by early June 1970.

[c]"Other cost" estimates for 1970-71 include:

Trips to India for the 211(d) Professor, Parker Cashdollar and family	- $ 7,500
Dependency allowances for four 211(d) Fellows	- 2,500
University fees for five 211(d) Fellows	- 5,500
Miscellaneous - U. S. travel, computer time, supplies, etc.	- 2,000
	$17,500