

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

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Batch # 28

1. SUBJECT CLASSIFICATION	A. PRIMARY Serials	Y-AC00-0000-0000
	B. SECONDARY Agriculture--Education, extension, and advisory work	

2. TITLE AND SUBTITLE
International program in crop production; annual report, 1970/1971

3. AUTHOR(S)
(101) Pa. State Univ. Dept. of Agronomy

4. DOCUMENT DATE 1971	5. NUMBER OF PAGES 8p.	6. ARC NUMBER ARC 631.5.P415
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7. REFERENCE ORGANIZATION NAME AND ADDRESS
Pa. State

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)
(Activity summary)

9. ABSTRACT

10. CONTROL NUMBER PN-AAB-638	11. PRICE OF DOCUMENT
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12. DESCRIPTORS Education, higher	13. PROJECT NUMBER
	14. CONTRACT NUMBER CSD-1932 211(d)
	15. TYPE OF DOCUMENT

THE PENNSYLVANIA STATE UNIVERSITY

COLLEGE OF AGRICULTURE

AGRONOMY DEPARTMENT

ANNUAL TECHNICAL REPORT OF 211(d) PROJECT

1970 - 1971

ANNUAL REPORT FOR THE PERIOD ENDING JUNE 30, 1971
211(d) INTERNATIONAL PROGRAM IN CROP PRODUCTION
AGRONOMY DEPARTMENT, THE PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY PARK, PENNSYLVANIA 16802

I. SUMMARY

During the 1970-71 project year, 211(d) project funds have been utilized to stimulate several new international activities in Agronomy at The Pennsylvania State University. International agronomy seminars were organized on a regular schedule and a tropical crops course was offered for the first time at the University. A monthly evening family program was initiated to describe international travel and family life abroad. The 211(d) staff was involved in arranging the schedules of several international visitors and organizing seminars for these guests. Advisement of 211(d) students interested in international agricultural development and foreign students has continued to improve over the past year. A close relationship among these students has developed.

Plant and soil science faculty participation in international programs continues to increase. Four faculty members in Agronomy were involved in programs in India during the past year. An AID sponsored educational program in crop production proposed for Argentina has been encouraged by the faculty. Production research was initiated this past year in grain sorghum and soybeans, important international crops but minor crops in Pennsylvania. Research projects of the four graduate students supported by 211(d) funds have become a part of and expanded our on-going programs. Excellent support and encouragement has been received from the office of International Agricultural Programs.

While the objectives of this project have not changed, the procedures will be modified during the next year. Penn State will focus attention on the dry-farming area of Maharashtra and will attempt to develop long-term relationships among several Indian and American professors in the crop and soil science areas. The project will continue to honor its commitments to the graduate students already in the program and encourage the continuation of the seminars already initiated. New approaches to the training of 211(d) students involving additional international work must be considered as students without prior foreign experience enter the program.

Expenditures of 211(d) funds this year have been at about the level predicted in the original proposal. The University continued to contribute significantly to the project and has encouraged a continuation of the grant. While out of country activities have been limited this past year, greater travel costs can be expected in the future. Although the third year carry-over of funds is much greater than expected, it is hoped that these funds

can be utilized by extending the project beyond the five-year period specified in the grant. A proposal has been presented to USAID to extend the grant and provide for a modest increase in funds. Without this support, project activities will be curtailed in future years.

II. 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 crop production;
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 crop production involving problems relevant to India;
4. To create an awareness and stimulate interest of plant and soil scientists in international assignments and careers; and
5. To encourage youth to seek training leading to careers in international agriculture.

III. MAJOR ACCOMPLISHMENTS

The Pennsylvania State University has continued to expand its international interest and involvement in crop production over the past year in all of the University's mission areas -- teaching, research and service. The availability of 211(d) funds has been one of the major reasons for this increased activity in the plant and soil science area.

Improvements in teaching and student advisement have been made. A course in tropical crops was offered for the first time in the spring term of 1971. The course was taught by Dr. C. S. Bryner who spent two years with AID in India and has other international crop production experience. A weekly international agronomy seminar organized by the 211(d) professor has been attended by interested faculty and graduate students, including Indian participants enrolled in our graduate program. Topic leaders have included international faculty and students as well as staff that have returned from overseas programs in other disciplines.

A monthly, evening family program was initiated. The purpose of this program has been to describe international travel and family life abroad. Families of the staff that have worked in international positions have made the presentations. Faculty and student families from all plant and soil science departments have attended these meetings. Arrangements were made by the 211(d) students and the Indian participants.

We are privileged to have Dr. K. G. Joshi, Director of Agriculture of Maharashtra State meet with students and faculty at Penn State on his trip to the United States this past spring and a portion of his expenses were paid from 211(d) funds. Several other international visitors met with the international agronomy group throughout the year, but no expenses to the project were involved. The 211(d) staff arranged to establish the itinerary for some of these visitors.

The broad, applied training of undergraduates in crop science has been encouraged. A complete study of the Agronomy major and all courses in the crop and soil science area has been completed during the year and is presently being considered by the agronomy faculty. The 211(d) Professor served as a member of the committee making the study. A new inter-departmental curriculum in plant science will be offered for the first time in the fall of 1971. This can be expected to provide several potential scientists with international crop production interests in the future. A new course at the undergraduate level will introduce students to several crops and production problems that were not previously covered in our existing courses.

Advisement of 211(d) graduate students interested in international agricultural development and foreign students has continued to improve over the past year. In most cases these students are placed under faculty with international experience. The 211(d) students have a co-advisor assisting them with their thesis research. This procedure has resulted in increased interest on the part of these faculty members in international agriculture. A close working relationship among the 211(d) and foreign students has been developed over the past year. While these students are being trained as outstanding applied technicians, they are also provided the opportunity to study the problems associated with international agricultural development. This past year they have taken courses in economics, agricultural economics, education, and agricultural education. It is doubtful that they would have had this opportunity as conventional graduate assistants.

Crop production research was initiated this past year at Penn State in grain sorghum and soybeans under the direction of the 211(d) Professor. These crops are of minor importance in Pennsylvania, but it is anticipated that results of work here may suggest leads for follow-up studies in India. Major factors being studied are planting patterns (including seedling emergence and seedling vigor), the effects of maturity on crop quality (including the development of a crop efficiency index), and intercropping (considering plant geometry). An M.S. candidate, James D. Bergman, is studying plant patterns and may conduct a portion of his thesis in India in the summer and fall of 1972. He is expected to complete his work by April 1, 1973.

Mr. Michael L. Colegrove is completing his thesis work on phosphorus fixation of Indian soils under the direction of Dr. D. E. Baker. Emphasis has been placed on sorghum production as it relates to plant nutrition and determining the international use of a new procedure for soil analysis. Mr. Colegrove plans to complete the Ph.D. requirements by September 1, 1971.

We are expanding our international plant improvement program through Mr. Wayne L. Haag, working on his Ph.D. in population genetics under the direction of Dr. R. R. Hill. Mr. Haag will travel to India for a three month period about January 1, 1972 to determine how the methods he is using can be included in plant breeding programs there. He is expected to complete his Ph.D. requirements by June 1, 1972.

A third Ph.D. candidate, Mr. David Wilson, is working with Dr. R. L. Cunningham expanding our program in the land use area. He is studying the relationships between soils and climates and crop production. Mr. Wilson plans to study and sample soils in India for about a three-month period starting September 1, 1972. He is expected to complete his work at Penn State by the winter term of 1973.

No attempt has been made to establish an international subject matter research project at Penn State. The 211(d) students have become a part of and are expanding our on-going research programs. International projects will be developed in the future based on faculty interest and expertise in an area.

Faculty involvement in consulting and service in international agronomy continued to increase in the past year. Dr. Roger Pennock has completed his third year as advisor in soil and water management for the state of Maharashtra in India. Dr. Thomas Webb is in his first year advising the state in seed production. Another plant scientist, Dr. Frank J. McArdle, is advising at Mahatana Phule University in the area of food science. Dr. Richard Cole, 211(d) Professor, was in India twice during the past year and participated in several state crop production meetings.

Dr. John E. Baylor, extension forage specialist, returned from his sabbatical leave in Australia in September. On his return trip he visited with the 211(d) Professor and University team members and studied the forage crop potential in India for a short period. After his return to the United States, his family was interviewed by the University television station. Their views and international experiences were heard throughout the state on three separate evening programs.

The Agronomy Department Head, Dr. James L. Starling, traveled to Argentina during the winter to investigate the possibility of establishing an educational project in crop production. Several faculty members have indicated they are interested in assisting in the program.

This past year has also brought the return of Dr. Robert Swope and Dr. Carlton Taylor from our AID India contracts to our International Agricultural Development office. Their experience has been and will be helpful when expanding international programs.

It should be noted that it would be easier to encourage potential scientists to seek training leading to careers in international agriculture if information on the out-of-country manpower needs were available.

This report represents a summary of the principal accomplishments of the 211(d) program over the past year. Some aspects of the program

are not easily measured or evaluated. The program has made a definite impact at Penn State University and is expected to continue to expand and to become more meaningful in the future.

IV. EXPENDITURES

The five-year budget, project costs for the period June 1, 1970 through November 30, 1970, and the cumulative expenditures through November 30, 1970 were as follows:

<u>Categories</u>	<u>Five-Year Budget</u>	<u>Cumulative Expenditures</u>	<u>Expenditures 6/1/70-11/30/70</u>
Salaries & Wages	\$146,000.00	\$32,745.40	\$13,138.00
Travel & Transportation	21,000.00	6,899.05	4,703.26
Equipment & Supplies	22,000.00	1,567.45	486.63
Other Direct Costs	11,000.00	424.23	110.97
Totals	\$200,000.00	\$41,636.13	\$18,438.86

The expenditures to date were significantly less than the amount expected based on the five-year budget. This is primarily because of the absence of a 211(d) professor from the project for approximately 1½ years at the start of the project. The expenditures for the six month period starting December 1, 1970 have exceeded those for the period ending November 30, 1970. For this reason, it would appear that the originally anticipated level of spending was an acceptable estimate with a full program. The contributions to the 211(d) program by the University resulting in increased program activities is estimated at approximately \$18,500 for the past fiscal year. These include direct costs in administration and bookkeeping, faculty support as advisors and on graduate committees; teaching in seminars and a tropical crops course; the free use of office and research supplies; the use of classrooms, laboratories and office facilities; the help of the agronomy secretaries; field research land costs, equipment rental and farm labor help; and library acquisitions at our request.

Three trips to India were made by the Penn State 211(d) staff during 1970-71. Dr. Richard H. Cole was in Maharashtra from June 22 through July 22, 1970 at a project cost of \$820.25 and in February 1971 at a cost of \$729.35 above travel expenses. On both trips he was involved in assisting with the field research of Mr. Michael L. Colegrove and considering future cooperative programs. Mr. Colegrove traveled to India on October 18, 1970 and returned to the University on November 29, 1970. He harvested the kharif sorghum crop, obtained leaf, seed, and soil samples for shipment to the U.S.A. and planted the rabi crop in his thesis research plots. He

stopped by the Wye College Experiment Station in Kent, England on his return from India. The total costs of his trip excluding GTR Travel was \$1,076.63.

Equipment purchased in 1970-71 costing in excess of \$100.00 includes the following: Perkin Elmer Corporation--replacement optics for Perkin-Elmer Model 303, Atomic Absorption Spectrometer, \$721.17 and Swanson Machine Company--Sample Plot Planter, \$285.27.

V. WORK PLAN AND BUDGET FOR NEXT YEAR

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

<u>Categories</u>	<u>1971-72 Budget</u>
Salaries & Wages	\$36,000.00
Travel & Transportation	9,000.00
Equipment & Supplies	6,000.00
Other Direct Costs	<u>2,500.00</u>
Total	\$53,500.00

A third year period carry-over of greater than \$130,000.00 is expected. It is hoped that the granting period can be extended to utilize existing funds beyond the five-year project period. The preliminary budget for 1972-73 indicates a need for \$54,600.00 that fiscal year.

While the objectives of the 211(d) project have not changed, the procedures utilized will be drastically changed this next year. Penn State will focus on a limited geographical study area in India, the dry-farming area of Maharashtra where agricultural modernization is slowly developing. Emphasis will be placed on establishing long-term relationships among Indian and American professors. Common problems will be identified cooperatively by the plant and soil scientists from The Pennsylvania State University, the counterpart universities in India, and our university teams in India. The faculty of the two agricultural universities in Maharashtra and the faculty at Penn State have indicated a desire to cooperate. It should be noted that more than one department will be involved in both universities.

To meet these objectives, the faculty considering travel to India with 211(d) funds during the next two years will be as follows:

Dr. R. L. Cunningham in Soil Resources

Dr. H. G. Marshall in Small Grain Improvement

Dr. R. G. Creech in Corn Improvement

Dr. D. E. Baker in Soil-Plant Analysis

Dr. J. S. Shenk in Crop Quality

Dr. G. W. Petersen in Soil Classification

Dr. R. H. Cole in Crop Production and Management

Dr. J. B. Washko will be working as a consultant under a three month contract with the AUD team at Mahatma Phule University in forage crop research and teaching. He has been an advisor for several of our foreign students and presently advises one of our participants from Maharashtra. His advice on future 211(d) contacts will be extremely helpful in the future.

During this same period, the project will honor its commitments to the graduate students already involved in the program. Three graduate students will be continuing their work the entire fiscal year. Two, already with considerable international experience, will be studying for a three month period in India. A fourth student is expected to complete his work on September 1 of this year. It is expected that additional graduate students will become involved after the proposed Indian-American Professor relationships are developed.

Plans will be made to continue our family seminar and the tropical crops course will be offered if there is sufficient interest among students. Special seminars will be organized when visiting scientists are on the campus. International subjects will be included in the regularly scheduled subject matter seminars. A tropical soils course should be offered for the first time at Penn State in 1972-73 and preliminary plans will be made to schedule the course. Faculty and students will be encouraged to study the effects of increased crop production on developing nations and participate in regularly scheduled international courses and seminars already offered at the University. A special study program in the development of the findings of our research will be initiated in 1971-72.

Because of their past international experience and background, the Penn State faculty has not encouraged its present 211(d) students to conduct a major portion of their research overseas. This would not have been possible with the typical American graduate student who has no foreign experience. Even with the students involved, more international experience would have been desirable and should be recommended for future students.

It should be noted that the approach we are taking at Penn State would indicate that we are expecting continued support of our 211(d) International Program in Plant and Soil Science. If all AID funds are removed at the end of the five-year granting period, many of the programs initiated will continue. The involvement in India would likely be terminated because of lack of funds. Reduced support would also mean that new innovations would not be as likely to be initiated. It is hoped that funds can be continued and increased slightly after the presently scheduled termination date.