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UNIVERSITY OF ILLINOIS

COLLEGE OF AGRICULTURE

DEPARTMENT OF PLANT PATHOLOGY

ANNUAL TECHNICAL REPORT OF 211(d) PROJEC.

1970 - 1971

## TECHNICAL REPORT #3

211(d) International Program  
University of Illinois  
May 1971

### I. SUMMARY

The AID (211(d) Program in plant pathology at the University of Illinois is approaching the end of its third year of activity, having officially begun in June 1968. This is the third 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 Reports #1 and #2 will not be reiterated except where necessary.

Plans for the remaining two 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, specifically in plant pathology. The limited funds of the grant do not permit development or expansion of other areas. It is felt that this is the area of international involvement that requires support at this time.

Approximately \$33,336 of 211(d) funds were expended during the year ending May 1971 in support of the Program. Of this amount \$30,367 was for salaries, stipends, and fringe benefits. The remainder \$2,969 was used to support the activities of the 211(d) Professor, and to provide expendable items for the research program. Over \$24,780 was provided from funds other than 211(d) for direct support of the Program during the year. This does not include funds provided by the USAID/Delhi Local Currency Contract. Excellent 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 (at the University of Illinois and other institutions), 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 contribute.

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. Through the efforts of the 211(d) Professor, two professors (one from the U.S., and one from Iran) are planning to take post-doctorate studies in the department during the coming academic year.

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 UI international programs this past year: (1) Advisory Committee to the UI Tehran Research Unit; (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

None of the accomplishments presented in this third annual report or those presented in the two previous reports would have been possible without the 211(d) Grant.

The 211(d) Program at the University of Illinois has continued to make substantial progress during the third year of activity. Staffing difficulties during the first year gave the program a slow beginning, but the remarkable progress during the past three years wholly justifies the efforts and support given by the University of Illinois, the College of Agriculture, AID, and CUSURDI to the entire program. The 211(d) Program is an outstanding success. The broad objectives of the grant are continually being met as the planning for the remaining two years of the Program are almost completed. It should be emphasized that the progress reported here and in the two previous reports was possible because of the efforts of many people. The accomplishments of this Program were possible because of: (1) substantial financial support from the University of Illinois, the College of Agriculture; and the Department of Plant Pathology; 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. The new course entitled: International Food Crops, Insects and Diseases, was offered for the first time during the Spring semester, 1971. This course was planned and developed as a joint venture between the 211(d) Professor and Prof. A. E. Thompson, Department of Horticulture. Both have had extensive international involvement. Six professors participated in the presentation of the lectures, five of whom have had overseas experience in agriculture. The professors have traveled and worked in many countries, including: Africa, countries in the Caribbean and Latin America; Indonesia, India and other Eastern countries; and several Arab countries. There were 11 students enrolled in the class, nine graduate students and two undergraduates. There were two students from Africa and two from India. The three disciplines represented were: horticulture, plant pathology and agronomy. The enrollment was considered excellent, since the course was not approved in time to be published in the regular university catalogue and class schedules.

The 211(d) Professor was responsible for a two-hour lecture on world population dynamics, and another two-hour lecture on world food production. In addition, he lectured on such topics as: (1) economic importance of plant diseases; (2) epidemiology of plant disease pathogens; (3) diseases of economic food crops of the tropics; (4) chemical and biological control of plant diseases; and (5) international agricultural research centers of the world. Horticultural, entomological and nematological aspects were presented by faculty members from the departments of horticulture, entomology and plant pathology.

The Department of Plant Pathology provided \$836 for teaching aids and materials in support of this course and other teaching activities of the 211(d) Professor.

A large number of seminars were given this past year both at overseas institutions and at the University of Illinois. A special seminar was given by the 211(d) Professor on the 211(d) Program in the Department of Plant Pathology. This was attended by faculty and students of the department, as well as members of the Illinois Natural History Survey. The audience was made aware of the progress of the 211(d) Program and its contributions to the growth of international agriculture programs at the University.

B. Development of Research Competence. A very active research and graduate training program has developed involving both American and Indian students since the completion of the research laboratory in May 1969 (see Technical Report #1). A number of American 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 over 16 research contributions have come from the program (see Table 1).

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 oil and food crop in India through the 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 American graduate students in the 211(d) Program committed to training for overseas work. A schedule for their formal course work and research training has been worked out. The schedule for each student's advanced training in India was formulated. In addition there were two students from India working with the five American students in the research program this past year: P. N. Thapliyal an USAID Participant, and P. D. Kharbanda, who is supported by departmental funds (\$4550). P. N. Thapliyal completed all the requirements for the Ph.D. and returned to UPAU in October, 1970. P. D. Kharbanda

will receive his Ph.D. in June, 1971 and is expected to return to U.P.A.U. Their programs were so arranged that they shared classes with the American students, as well as office and laboratory space. An excellent rapport and understanding developed between these men and will continue while they are in India. P. N. Thapliyal has been working with R. A. Sikora since his arrival in September. R. A. Sikora is one of the Americans in the Program. A third Indian student from J.N.K.V.V. will enter the program in September 1971.

There is a sixth student involved in the 211(d) Program, but because he has had previous overseas experience, he is not scheduled to study in India. R. W. Slusher entered into a Ph.D. Program in September 1970. He has had over 3 years of agriculture experience in Taiwan before coming to the University of Illinois to study plant pathology.

Besides the graduate students listed above that are involved directly with the 211(d) Program, the 211(d) Professor has acted as adviser and committee examiner for a number of other students, both foreign and domestic, in this department as well as other departments in the college.

Table 1. Listing of research publications by faculty and students involved with the University of Illinois 211(d) Program

- 
- ✓ 1. Gray, L. E., P. N. Thapliyal & J. B. Sinclair. 1970. A rating system for determining soybean yield reduction by Cepholosporium gregatum. *Phytopathology* 60:1024.
  - ✓ 2. Thapliyal, P. N., & J. B. Sinclair. 1970. Uptake of three systemic fungicides by germinating soybean seed. *Phytopathology* 60:1373-1375.
  - ✓ 3. Thapliyal, P. N., & J. B. Sinclair. 1970. Uptake of three systemic fungicides by germinating soybean seed. *Seed and Soil Treatment Newsletter* 12:30-31.
  - ✓ 4. Meyer, W. A., & J. B. Sinclair. 1970. Pyrenochaeta terrestris, a root pathogen on creeping bentgrass. *Plant Dis. Repr.* 54:506-507.
  - ✓ 5. Gray, L. E., & J. B. Sinclair. 1970. Uptake and translocation of systemic fungicides by soybean seedlings. *Phytopathology* 60:1486-1488.
  - ✓ 6. Meyer, W. A., P. N. Thapliyal, J. A. Frank, & J. B. Sinclair. 1970. Phytoalexin production in soybean roots. *Phytopathology* 60:1304 (Abstr.).
  - ✓ 7. Thapliyal, P. N., & J. B. Sinclair. 1970. Uptake and distribution of three systemic fungicides in soybean seedlings. *Proc. VII Intern. Cong. Plant Prot. (Paris):* 735 (Abstr.).
  8. Sinclair, J. B., & L. E. Gray. 1970. Uptake and translocation of <sup>14</sup>C-labeled and nonlabeled systemic fungicides by soybean. *Proc. VII Intern. Cong. Plant Prot. (Paris)* 736 (Abstr.).

- ✓ 9. Meyer, W. A., M. P. Britton, L. E. Gray, & J. B. Sinclair. 1970. Fungicide effects on fungal ecology in creeping bentgrass turf. *Mycopath. et Mycol. Appl.* 41:167-173.
- ✓ 10. Meyer, W. A., P. N. Thapliyal, J. A. Frank, & J. B. Sinclair. 1971. Detection of phytoalexin in soybean roots. *Phytopathology* 61: in press.
- ✓ 11. Meyer, W. A., M. P. Britton, J. D. Butler, & J. B. Sinclair. 1971. Control of stripe smut on creeping bentgrass by benomyl. *Amer. Phytopathological Soc. Fung. & Nematicide Tests*, 26:122.
- ✓ 12. Schneider, R. W., P. N. Thapliyal, & J. B. Sinclair. 1971. Fungi associated with soybean seed from India. *Indian Phytopathology*: in press.
- ✓ 13. Sinclair, J. B., L. E. Gray, & P. N. Thapliyal. 1971. Systemicity and disease control with certain fungicides in soybean. *Proc. 2nd Intern. Symposium Plant Pathology (New Delhi)*:84-85 (Abstr.).
- ✓ 14. Sinclair, J. B., W. A. Meyer, & P. N. Thapliyal. 1971. Effects of Phytophthora megasperma var. sojae infection on soybean. *Proc. 2nd intern. Symposium Plant Pathology (New Delhi)*:79-80 (Abstr.).
- ✓ 15. Sinclair, J. B., L. E. Gray, W. A. Meyer, R. W. Schneider, & P. N. Thapliyal. 1971. Epidemiology, spread and control of Phytophthora megasperma var. sojae and Cephalosporium gregatum in soybean. *Proc. symposium on Epidemiology, Forecasting and Control of Plant Diseases (Lucknow)*. (Abstr.). in press.
16. Sinclair, J. B. 1970. Rhizoctonia solani: special methods of study. 199-217. In: J. R. Parmeter, Jr. (ed.) Rhizoctonia solani, biology and pathology. Univ. California Press, Berkeley.

C. The Graduate Student Program. An unexpected, but very desirable, feature in the graduate student program developed this year. The original plans of the 211(d) Program was to completely support graduate students with 211(d) dollars while gaining their overseas experience in India. There were insufficient funds provided in the original 211(d) grant to accomplish this aspect of the program. In 1970-71, and now approved for the 1971-72, graduate students can be supported by USAID/Delhi Local Currency Contracts. This and the 211(d) Program are being used by the University of Illinois to complement one another. While the graduate students are receiving their basic training in course work and research in the U.S., they are supported by the dollar budget from the 211(d) Grant College of Agriculture and departmental funds. While studying in India, some of them will be supported by a USAID/Delhi Local Currency Contract. This would seem to provide an excellent pattern for use in developing similar programs in the future.

The plans for the advanced training in India of the graduate student for the remaining two years of the 211(d) Program are completed. There are five students in the Program.

Richard A. Sikora - R. A. Sikora completed all the requirements for the Ph.D. in plant pathology with an emphasis in phytonematology in

August 1970. He was accepted as a special student in the Department of Plant Pathology at Uttar Pradesh Agricultural University and began his work in September 1970. He is expected to remain at this position for approximately 1 year, thus ending his studies sometime in August 1971. He is being supported by the USAID/Delhi Local Currency Contract, by the UI College of Agriculture and department of plant pathology. He has been active in the teaching, research and graduate student training programs at U.P.A.U. Progress reports of his work are on file at UI.

William A. Meyer - W. A. Meyer was supported by both 211(d) funds and other funds through December, 1970. He met all the requirements of the Ph.D. through the preliminary examination in the Fall, 1970. He was accepted as a special student at J. Nehru Krishi Vishwa Vidyalaya, Jabalpur and began his studies there in January, 1971. He will be studying in the department of plant pathology at J.N.K.V.V. for approximately 1 year, thus ending his studies sometime in December, 1971. He is being supported by the USAID/Delhi Local Currency Contract and by UI College of Agriculture and department of plant pathology funds. A work plan was approved involving research, observing teaching methods, and working with other graduate students in the department. The work plan and first progress report are on file at UI. He is expected to be supported by 211(d) funds on his return to the U.S. to complete his Ph.D. thesis.

Bruce L. Kirkpatrick - B. L. Kirkpatrick began his work on the M.S. degree in June, 1970 under 211(d) funds. He is the only M.S. candidate in the 211(d) Program. He will complete his course requirements for the M.Sc. in June 1972 and take six months advance training as a special student at U.P.A.U. beginning in August, 1971. Mr. Kirkpatrick will be supported entirely by 211(d) funds while in India. He is expected to return to UI in February 1972 to write this M.Sc. thesis and his support at that time will be continued on 211(d) funds.

Raymond W. Schneider - Mr. Schneider is currently supported by both 211(d) and the College of Agriculture and department of plant pathology funds. He received his M.Sc. in plant pathology in January 1971 and is now entered into a Ph.D. program. He is scheduled to have completed all of the requirements for the Ph.D. through the preliminary examination by February, 1972. Negotiations will be started this year to arrange for him to study as a special student at U.P.A.U. for 1 year beginning in February 1972. He will be supported by 211(d) funds while in India and on his return to complete his Ph.D. thesis in March 1973.

James F. Nicholson - J. F. Nicholson began his work on the Ph.D. in June 1970 with support from both 211(d) and College of Agriculture international funds. He is expected to complete all the requirements for the Ph.D. through the preliminary examination by Fall 1971. Negotiations will be started this year to arrange for him to study as a special student at J.N.K.V.V. for 1 year, beginning in February 1972, and supported by USAID/Delhi Local Currency Contract and 211(d)

funds while in India. He will return to the U.S. to write his thesis about March 1973 and will be supported by 211(d) funds at that time:

Robert W. Slusher - R. W. Slusher began his work on the Ph.D. September 1970. He will be partially supported by 211(d) funds, but is not scheduled to go to India, since he has had 3 years of overseas experience in agriculture while working in Taiwan. His knowledge and experience adds to the quality of the program. He can speak from firsthand experience about working in a developing country.

D. 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 absolutely necessary that the 211(d) Professor make at least one trip to India each year.

These trips not only allow the 211(d) Professor to set up the essential esprit de corps so that the logistics of the program can be worked out, but it is mandatory that he accompany the students to India. None of these young men (and their families) have had any international travel experience, let alone the experience of working in a developing nation. The 211(d) Professor can be of invaluable assistance to these young people helping them to adjust to the new situations found in foreign countries.

Professor Sinclair made a visit to India during December 1970 through February 1971 at a cost of approximately \$2700. He accompanied Mr. and Mrs. W. A. Meyer and their infant daughter to Jabalpur. He participated in the 2nd International Plant Pathology Symposium of the Indian Phytopathological Society held in New Delhi January 29 - February 3, 1971. He gave two papers and set up an exhibit concerned with extension plant pathology at the University of Illinois. He participated in the Symposium on Epidemiology, Forecasting, and Control of Plant Diseases in Lucknow, sponsored by the Indian National Science Academy by giving a paper on soybean diseases. These meetings gave him the opportunity to meet and discuss problems of mutual interest not only with Indian plant pathologists, but scientists from all over the world.

Other Indian institutions visited were: J. Nehru Krishi Vishwa Vidyalaya, Jabalpur; National Botanical Gardens, Lucknow; Lucknow University, Indian Institute of Sugarcane Research; Uttar Pradesh Agricultural University, Indian Agricultural Research Institute; Agra; and Indian Academy of Science, Agra.

During this trip Professor Sinclair gave a series of seminars on systemic fungicides at the various institutions visited. While

at J.N.K.V.V.: he helped Mr. and Mrs. Meyer settle in their new quarters; he assisted in the writing of a work program for W. A. Meyer; reviewed research and teaching programs with various staff members in the department of plant pathology; and met with graduate students. While at U.P.A.U., he reviewed the work and accomplishments of R. A. Sikora; reviewed research and teaching programs of various staff members in the department of plant pathology; and met with graduate students. While in New Delhi, he met with various members of the USAID staff concerning the logistics of the Local Currency Contracts scheme for graduate students; he assisted the W. A. Meyers' in their various problems of clearances, etc.; met with members of the Ford and Rockefeller Foundations; and with staff members of I.A.R.I.

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

England - Shell International and the Imperial College of London.

Lebanon - American University of Beirut.

Iran - USDA Regional Pulse Improvement Project, UI Tehran Research Unit; and University of Tehran (Faculties of Science and Agriculture).

Morocco - Institut Agronomique Hassan II, Rabat

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. Appointed as a member of the Advisory Committee to the University of Illinois' Tehran Research Unit (TRU) in Iran. While in Tehran during this last trip he participated in executive meetings concerning the future development of TRU.

2. Collaborator in Two College of Agriculture International Programs. Professor Sinclair continues to serve for an indefinite time 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. Professor Sinclair has traveled to Jamaica, Trinidad, 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.

Recognition of the international status and involvement of the 211(d) Professor was shown this past year by the presentation of invitational papers at two international meetings:

1. VII International Plant Protection Congress (Paris) 21-25 September 1970. The University of Illinois College of Agriculture provided partial support (\$650) for attendance to this meeting. Following this meeting, Professor Sinclair visited both the Cyprus Agriculture Research Institute, and the Ministry of Agriculture and Natural Resources, where he gave a seminar on systemic fungicides. He also visited with personnel at FAO in Rome, as well as the recently established American University of Rome.

2. Seminar on Plant Protection of Tropical Food Crops, (Ibadan, Nigeria) 24-28 May 1971. At the invitation and expense of the International Institute for Tropical Agriculture, Professor Sinclair participated in this seminar and gave a paper on "Fungicides for use on Tropical Food Crops". Following this meeting he visited the East African Agriculture and Forestry Research Organization, National Agricultural Laboratories, and the University of Nairobi - all in Nairobi, Kenya. He also visited Njala University College, Sierra Leone and Lagos University in Nigeria.

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

1. He is continuing to serve as a "Career Consultant" in Agriculture/Plant Pathology for the Peace Corps. He has answered direct mail inquiries, as well as held personal conferences with Peace Corps trainees.

2. He was named to the American Phytopathological Society's International Cooperation Committee. One of their projects is to encourage plant pathologists who are nearing retirement to contribute their back numbers of journals to overseas institutions. Dr. W. M. Bever, Head of the UI Department of Plant Pathology, has contributed 42 volumes of PHYTOPATHOLOGY to Njala University College, Sierra Leone.

3. The 211(d) Professor encouraged the visit of Dr. R. S. Singh, an outstanding and distinguished professor of plant pathology from Uttar Pradesh Agricultural University, to come to the UI campus to visit various professionals, give a seminar to graduate students and faculty, and to visit with the 211(d) graduate students. Dr. Singh has been a key adviser to R. A. Sikora during the latter's stay at U.P.A.U.

4. He has laid the ground work to have Dr. Eskandari, Faculty of Agriculture, University of Tehran, to study as a post-doctorate student in the UI Department of Plant Pathology for 6 months beginning

September 1971.

5. He has made arrangements and encouraged Dr. J. C. White, Louisiana Polytechnic Institute to study as a post-doctorate candidate for 3 months in his laboratory beginning in June 1971.

6. 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.

7. 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.A.D., and other similar agencies. This work will continue so that employment for the 211(d) students may be assured after they finish training.

Resumés of the program were published in the PHYTOPATHOLOGY NEWS, the NEWSLETTER of the International Society for Plant Pathology, and the NEWSLETTER for the Association for Tropical Biology, Inc.

E. Involvement of Other University 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 were 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 laboratories, 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. \$1,400 for a 1/4-time secretary.
3. \$900 for office supplies.
4. \$836 for teaching aids and supplies.
5. \$2,969 for graduate student support.

**The College of Agriculture by providing**

1. \$6000 through regional research funds.
2. \$250 for renting approximately 1/2 acre of land for experimental field plots.

**The Office of International Agriculture Programs (College of Agriculture) by providing:**

1. \$1,500 for research and teaching concerned with tropical food crops.
2. \$650 for international travel of the 211(d) Professor.
3. \$10,469 for graduate student support.
4. \$1,775 for equipment.

Thus, over \$24,780 was provided from funds from other than 211(d) for direct support of the 211(d) Program in the fiscal year 1970-71. For 1968-69, the amount was over \$15,000, and for 1970-71, the amount was over \$25,850. So the total to date is over \$65,630. This does not include the USAID/Delhi Rupee support funds.

#### IV. INTERNATIONAL PROGRAMS OF THE UNIVERSITY OF ILLINOIS COLLEGE OF AGRICULTURE

A relatively high and increasing level of activity in international programs continued throughout 1970-71. A principal objective of the Office of International Agricultural Programs is to strengthen the international departments. One technique being employed is to organize interdisciplinary projects, each under a supervisor or director.

Program for International Research, Improvement and Development of Soybeans (PIRIDS) has received campus-wide support and world-wide expressions of interest and enthusiasm.

Some ten or twelve requests for seed, information and services were received during the first four months of 1971. We have provided a man for a short-term assignment in West Pakistan and for a soybean feasibility study by a team of specialists in Thailand, both under the auspices of FAO.

This project was initiated in July 1969 with support of a modest grant from Rockefeller Foundation. Additional financing was provided through the Office of International Agricultural 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 the protein deficiency. The Department of Food Science has continued the development of highly palatable soybean products by simple processing methods. Products include (a) beverages (soymilk and variations of it), (b) canned soybeans as salad and in mixtures such as with pork, chicken, lamb, and vegetarian, and (c) various types of dried products.

Strategies for Agricultural Development, another multi-disciplinary project, has become more active during the past year. Two faculty members and two graduate students (one U.S. and one Sierra Leonean) in the Department of Agricultural Economics, worked on strategies and policies for rice production in Sierra Leone. Work was also done on financial, tax and fiscal policy of the government. The work is continuing

Another sub-project of the "Strategies" program is being conducted by an agronomist and his graduate students. They are studying potential relationships between wheat (a dry season crop) and pulse crops (primarily monsoon crops) in Madhya Pradesh, India, a State which has very little irrigation. The faculty member visited India to do field work early in 1971. This is particularly relevant since soybeans are being introduced as a monsoon crop.

Two young faculty members in the Department of Agricultural Economics, both with overseas experience, are working on a simulation model for the wheat economy of North India. One of the men made a trip to India in early 1971. Cooperation of Indian economists and of agricultural economists in AID/Delhi are being solicited. It is hoped this may be expanded to an all-India model and prove useful for agricultural planning.

Another sub-project is one on sector modelling. Some basic work is being done on this at present.

A Tropical Root Program was initiated slightly more than one year ago. It is also a multi-disciplinary project involving the Departments of Agronomy, Horticulture, and Plant Pathology. All phases of this work have been very active in cooperation with the University of the West Indies. One of their faculty members was on campus as visiting professor during the summer of 1970. Several of our staff members have made visits to enhance the cooperative work.

The 211(d) project in plant pathology continues at a high level of activity including substantial graduate student involvement. Two U.S. graduate students in plant pathology are doing doctoral research in India at present. Two more will be going to India to do research next year.

The very ambitious program of the agricultural entomologists has continued to expand with a substantial overseas involvement. A graduate student completed 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.

A Ford Foundation grant to 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 has returned from India where he did his doctoral research under this program. Several faculty members served in India under this program during the past year.

Dr. W. N. Thompson served on assignments in India and Thailand. This is a continuation of the USAID institution-building activity in which the College of Agriculture, particularly the Department of Agricultural Economics, has been involved.

Graduate student involvement overseas has increased. Four positions were provided for in India last year. Three students, two in plant pathology and one in agricultural economics, are in India at present. A student in dairy science returned from Thailand and one in entomology from India. Prospects for graduate student doctoral dissertation work

next year are as follows: three in India, one each in plant pathology, food science, and animal science; one in animal science in Indonesia; one in animal science in South America.

USAID contract involvement remained at about the same level as the previous year with near full staffing being achieved.

The Njala University College contract is to be phased out by July 1974.

Total staffing of the India programs may increase slightly as a result of the additional of an APP team in Madhya Pradesh. This will be offset in part by the announced intention to phase out the present USAID contract at UPAU by July 1973.

Two short-term consultants served under the MUCIA-Indonesia contract. Increasing participation in that program is probably next year.

The College of Agriculture is involved overseas in other ways. The Crop Evolution Laboratory continues fully staffed and active. Faculty members, personally and individually, maintain contact with colleagues overseas, advise and supervise graduate students, use sabbatical leaves for overseas study and work, etc. Fourteen courses of the College are listed by the University of Illinois as international in nature.

Faculty interest in international activities continued to increase during the past year. Graduate student involvement in the programs has attained a new high. There is evidence of increasing interest on the part of undergraduate students. It is essential that additional funding be found to maintain the level of overseas involvement achieved in recent years.

## V. 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, \$2,641 was used during the second year, and \$6,500 for this year. Travel expenses shown are for U.S. travel, for the consultant visit of Dr. Moore in 1968-69 (see annual report #1) and for the estimated costs for international travel (see footnote below). There were no major items purchased this year.

Budget Summary						
	1968-69	1969-70	1970-71	1971-72	1972-73	Total
Salaries	15,654	22,582	23,867	-----	-----	62,103
Stipends	-----	2,641	6,500	-----	-----	9,141
Travel	2,514 <sup>a/</sup>	3,103 <sup>a/</sup>	2,902 <sup>a/</sup>	-----	-----	8,519 <sup>a/</sup>
Equipment and supplies	8,789	13,756	67	-----	-----	22,612
<b>Total</b>	<u>27,957</u>	<u>42,082</u>	<u>33,336</u>	-----	-----	102,375

<sup>a/</sup> This travel figure includes the estimated cost of international transportation of Professor Sinclair. Upon receipt of an official advice of charges from the Grant Office, this amount will be included as an exact expense.

A single international trip was made during the year under sponsorship of the 211(d) Program from December 28, 1970 - February 13, 1971. Mr. and Mrs. William A. Meyer and their infant daughter were accompanied by me to India. Mr. Meyer is the second student from the Department of Plant Pathology to study and do research as a special student in India. The first student, Richard A. Sikora, is now studying at U.P.A.U., and Mr. Meyer will be studying at J.N.K.V.V. for one year.

The administrators, members of the research and teaching staffs, and facilities of most of the following institutions were visited at an approximate cost of \$2,600. 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 most of the institutions visited. The exceptions were: Shell International, Imperial College of Science and Technology; American University

of Beirut; and the Institut Agronomique, Hassan II. The students were either on a holiday or on strike at one or the other of these educational institutions. The seminars dealt with recent advances in research concerned with systemic fungicides, and soilborne pathogens on soybean. Three invitational research papers were given at two international symposia, one held in Lucknow and the other in New Delhi.

England (London):

Shell International  
Imperial College of Science and Technology

Lebanon (Beirut):

American University of Beirut

India:

Jabalapur - J. Nehru Krishi Vishwa Vidyalaya  
Lucknow

Lucknow University  
National Botanical Garden  
Symposium on Epidemiology, Forecasting, and Control  
of Plant Diseases

Pantnagar - Uttar Pradesh Agricultural University  
New Delhi

UCAID  
Ford Foundation  
Rockefeller Foundation  
Indian Agricultural Research Institute  
Second International Symposium on Plant Pathology

Agra

Agra College  
Indian National Science Academy

Iran (Tehran and Karaj):

University of Illinois Tehran Research Unit  
University of Tehran  
Faculty of Science  
Faculty of Agriculture  
Regional Pulse Improvement Project (USDA)

Morocco (Rabat)

Institut Agronomique, Hassan II  
USAID

REPORT BY COUNTRY

England and Lebanon. The timing of the visits to the institutions in these countries, unfortunately, was not good. Even though predeparture correspondence arranged for appointments with P. Brudenell of Shell International (London) and R. K. S. Wood of Imperial College of Science and Technology (London) personnel were difficult to reach or were out of town because of the Christmas-New Year holiday. However, some meetings with faculty and administrators were arranged.

The W. A. Meyers and I were able to visit the AUB campus and some of the facilities. We met with Drs. Halleb and Saad, as well as Dean Swenson. Earlier reports made by D. P. Taylor and myself have commented on programs and facilities at AUB. At some time in the future, if placement of advanced graduate students is planned for countries other than India, AUB should be considered.

India. This was my third trip to India. The primary purposes of this visit were:

1. To accompany and assist William A. Meyer and his family to becoming established in India for a year's study at J.N.K.V.V.;
2. To review the progress and program of Richard A. Sikora, who began his work in 1970 September as a special student at U.P.A.U.;
3. To participate in and give papers at two international plant pathology symposia held in India;
4. To further assess the development of plant pathology at J.N.K.V.V., U.P.A.U., and I.A.R.I.; and
5. To strengthen the cooperative relationship between the University of Illinois and plant pathologists and other agricultural personnel at I.A.R.I., U.P.A.U., J.N.K.V.V., and other Indian institutions.
6. To increase the experience of the 211(d) Professor in international agriculture.

The first four days in India were spent in New Delhi making all the necessary arrangements, for the Meyers' arrival and stay in India. This included a number of visits to the USAID offices and to various Indian governmental agencies to clear customs, etc. During this time, I was able to visit with plant pathologists at the Ford Foundation. While at the Ford Foundation, the progress in rust disease epidemiology and forecasting was reviewed.

Approximately 10 days were spent at J.N.K.V.V., Jabalpur. This time was spent with personnel at J.N.K.V.V. and those under USAID sponsorship. A work plan for W. A. Meyer was designed and approved by the persons involved. Copies of this plan were sent to the interested personnel both in India and at the University of Illinois. An outline of his research, involvement in teaching, seminar presentation, travel, supplies, and quarterly reports are presented. In general, everything seemed to be worked out to the satisfaction of all concerned. It appeared that the staff in the Department of Plant Pathology at J.N.K.V.V. was doing everything possible to make Mr. Meyer feel welcome and to provide him with the best accommodations available.

It was my impression that the facilities in the Department of Plant Pathology of J.N.K.V.V. have continued to improve. There was more field space allotted to the department this year. There was an effort on the part of some of the teaching faculty to upgrade the quality of teaching of their respective courses. Much of the equipment that was idle last year, has been put into working condition. A number of small, but important items were corrected, such as getting most of the electrical outlets in the student laboratory into working condition. There is still much to be done, but progress is being made. The one thing that still impresses me is: the methods for cleaning the floors of the rooms and corridors each day. Something should be done to keep the clouds of dust from rising when the sweepers are working.

Preliminary discussions were held concerning the program of J. F. Nicholson. Discussions were held with the faculty members and students in the department at J.N.K.V.V. concerning their research and teaching. Visits were made to the experimental field plots. Most of the plant pathology experimental plots were brought under irrigation this year. There is excellent work being done on gram wilt.

Approximately 5 days were spent traveling from Jabalapur to Pantnagar and in Lucknow to participate and give a paper at the "Symposium on Epidemiology, Forecasting and Control of Plant Diseases." This gave me an opportunity to get acquainted with the research work and workers in this area of research. The quality of the papers to be presented at the International Symposium in Delhi a few weeks later, exceeded those presented at Lucknow. The facilities at the Botanical Garden were visited and are impressive. This group appears to be well-financed by the government.

The period of 20 - 25 January was spent at U.P.A.U. Discussions were held with various members of the administration concerning the progress of R. A. Sikora. In every case the reports were excellent. Mr. Sikora is doing outstanding work in his teaching, his research and particularly in his relations with the Indians. Copies of his first quarterly report have been duplicated and sent to all interested parties. Mr. Sikora was pleased with his accommodations and accomplishments.

Conferences with faculty members, field trips, meetings with graduate students, etc., were accomplished. The greenhouses for the department have been completed. There has been a lot of remodeling in the department, much needed improvements in the physical facilities have been made. They have added a number of young staff members to the department. The department continues to be outstanding.

More space is being remodeled for laboratories and faculty offices. Two new courses have been introduced, one on epidemiology and one on genetics of plant pathogens. It is expected that the department will have its own budget by March 1971. In time, each faculty member will have a budget of his own.

Preliminary discussions were held with the administrators concerning the programs of B. L. Kirkpatrick and R. W. Schneider.

The period of 27 January - 4 February was spent in New Delhi to attend the Second International Symposium on Plant Pathology. It was a great meeting. The attendance role read like a "Who's Who in International Plant Pathology". This gave me an excellent opportunity to become acquainted with research workers from all over the world, as well as India. Some excellent contacts were made. The papers, generally, were quite good. I brought material with me from the University of Illinois and set up a display of extension material concerned with the control of plant diseases. Two papers were presented by me at this meeting. I had a number of meetings and informal conferences with other plant pathologists, and students, besides attending the various sessions. Both Mr. Sikora and Mr. Meyer were at the meetings. We were able to discuss their respective programs and progress. Mr. Meyer was pleased with the efforts and progress made on his behalf within just the two or three weeks he had been in India.

Iran. The University of Illinois Tehran Research Unit was visited. As a member of the advisory committee, I sat in on a business meeting concerning T.R.U. I was impressed with the efforts of Dr. Sullivan and Mr. Hoemeke to solve some of the problems and felt I could better serve the group.

Dr. Walter Kaiser of the U.S.D.A. Regional Pulse Improvement Project was visited. The facilities of the Faculty of Science (Tehran) and College of Agriculture (Karaj) were visited. I had the opportunity to discuss research of pulse crops with various members of the group.

It appears that the next emphasis on agriculture research on an international basis should be on the pulse crops. Much effort has been made on maize, wheat, rice, and sorghum. The pulses represent a large group of leguminous field plants that provide a main source of food for many peoples in the tropical and subtropical areas of the world.

Morocco. Dr. John Blackmore, Director of the Office of International Agricultural Programs, University of Minnesota, was in Rabat at the time of my visit. The University has an institutional development program at the Institut Agronomique, Hassan II. Five countries are involved in the development of this institution: USA (through USAID), Canada, Belgium, France, and Moroccan government. There are new buildings to house the various disciplines, but they lack equipment. The program is just beginning. Instead of a Chief of Party, the program is handled by the Dean of the Institute. All communication is in French or Arabic. There is no teaching of formal courses as yet. The students were on strike during my visit. Some research can be done. I spent most of my time in the Departments of Plant Science and Plant Pathology.

## VI. WORK PLAN AND BUDGET FOR 1971-72

### A. Without additional funding:

The work plan for the remaining two years of the grant was outlined in previous sections. The teaching, research, and graduate training programs, as well as the development of the various competences will continue. There are two trips (the last on 211(d) funds) planned to India during the next fiscal year: (1) during July - September 1971 to accompany B. L. Kirkpatrick to U.P.A.U. and to become acquainted with pulse crop production in the field; and (2) during February - March, 1972 to accompany J. F. Nicholson and R. W. Schneider (and their families) to J.N.K.V.V. and U.P.A.U., respectively. These trips will be used to assess the graduate student training program and explore possibilities of future graduate student exchanges. Unless additional funds are forthcoming, there will be no opportunity to fully assess the program in India in 1973.

As part of the continuing effort to have an Indian student working with the 211(d) graduate students in this laboratory, Mr. O. D. Dhingra, has been accepted for study. Mr. Dhingra is from J.N.K.V.V. and will be studying for a Ph.D. in plant pathology beginning in September 1971.

Through the efforts of the 211(d) Professor, Dr. F. Eskandari, Head, Plant Pathology Section, Plant Pest Control Department, Faculty of Agriculture, University of Tehran, Karaj, may come to the UI Department of Plant Pathology as a post-doctorate candidate to study for 6 months at his own expense. Plans are not complete at this time. He will be a fine addition to the department and will allow the faculty and students to become acquainted with a fellow plant pathologist from Iran.

Another post-doctorate candidate will study in this laboratory for 3 months beginning about June 1, 1971. Dr. James C. White, Louisiana Polytechnic Institute will study in this laboratory with the 211(d) graduate students. He is interested in soybean diseases and is doing research in this area. There is no doubt that he will become fully acquainted with the international program and the efforts of the AID for assisting developing nations. Again, Dr. White is coming to study because of the efforts of the 211(d) Professor. Dr. White will be coming at his own expense.

The experience gained from administering the 211(d) grant for approximately three years shows that the original allocated funds will not be sufficient to carry out all the original purposes of the grant for the remaining two years. At best, the original funding was considered minimal. If it were not for the excellent support of the UI, College of Agriculture, International Agricultural Programs Office, and the Department of Plant Pathology, the outstanding accomplishments of this unique program would not have been possible. Similarly, the Rupee support from USAID/Delhi Local Currency Contracts this past year and for 1971-72 was provided at a very appropriate time. It is hoped that this new arrangement will continue

in the future even though the 211(d) Program may be allowed to terminate.

It was the hope of AID-Washington that 211(d) funds would be used to "seed" other campus projects related to international agriculture. But quite to the contrary, other university funds were used to support the poorly funded 211(d) Program. 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 graduate 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. A sixth student will not be sent overseas.

Funds for the support of ancillary 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 two 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 1971-1973 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	23,867	25,433	26,890	114,426
Stipends	41,400	--	2,641	6,500	16,950	11,400	37,491
Travel	13,000	1,314	2,989	2,902	8,791	8,042	24,038
Equipment and Supplies	30,580	8,789	13,756	67	500	933	24,045
Totals	200,000	25,757	41,968	33,336	51,674	47,265	200,000

**B. With additional funding:**

With additional funding the momentum of the present program would be continued. It seems inadvisable to terminate this excellent program in June 1973 because of the lack of funds. Any additional funding must be indicated immediately, if additional graduate students are to be accepted into the program. A minimum of an extension of two years is necessary in order to complete the program of any new graduate students. If additional funds are provided for a two-year extension, some of the following items could be initiated and accomplished:

1. Ancillary programs, such as visiting professorships, seminars, conferences, meetings, with international significance, undergraduate programs, etc.;

2. A trip to India during the latter part of 1973 to make an evaluation of the entire 211(d) Program both there and in the U.S. institutions;

3. Expand the research involvement to include interdepartmental studies on diseases and pests of pulse crops, including soybean;

4. Initiate an interinstitutional program with Missouri/USDA and others on agricultural problems concerned with pulse crops;

5. Explore the possibility of relatively short-term visits to overseas institutions by both faculty and graduate students; and

6. The involvement of institutions in other countries than India for the overseas training of graduate students, such as Indonesia, Sierra Leone, countries of the tropical Americas, and other developing nations.