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931015411/49  
PD-ANN-037

DEPARTMENT OF STATE  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
WASHINGTON, D.C. 20521

SEP 22 1978

Dr. Rafael Pietri Oms  
Chancellor  
University of Puerto Rico  
Mayaguez Campus  
College of Agricultural Sciences  
Agricultural Experiment Station  
Rio Piedras, Puerto Rico 00928

Subject: 211(d) Grant No. AID/CX/ta-  
G-73-50 - Amendment No. 2  
Technical Office: DS/AGR/FCP

Dear Dr. Pietri Oms:

Pursuant to the authority contained in the Foreign Assistance Act of 1961, as amended, the subject grant is hereby amended for the purpose of extending the grant for a period of two (2) years from September 17, 1978 to September 16, 1980. For the above mentioned two (2) year period, \$337,676 is hereby obligated, increasing the total obligated amount of the grant to \$837,676. For the said two (2) year period the grantee will proceed in accordance with his proposal which has been made a part of this grant, Exhibit A of Attachment 1A.

In addition to the above, the Program Description (Attachment 1A), attached hereto, applies to the effort to be expended between September 17, 1978 and September 16, 1980.

Except as expressly amended, the Grant remains in full force and effect in accordance with its terms.

Please sign the original and seven (7) copies of this letter to acknowledge your acceptance of the conditions under which these funds have been granted. Then return the original and six (6) copies.

Sincerely yours,



Morton Darwin  
Grant Officer  
Agriculture/Nutrition Branch  
Central Operations Division  
Office of Contract Management

**Attachments:**

1. Program Description

**ACCEPTED:**

UNIVERSITY OF PUERTO RICO

BY: Luis K. Otero

TITLE: Chancellor

DATE: October 5, 1978

**Fiscal Data**

Appropriation No.: 72-1181021.3  
Allotment No.: 843-36-099-00-34-81  
PIO/T No.: 3189154  
Project No.: 931-0154.11  
Amendment Amount: \$337,676  
Total Grant Amount: \$837,676

Program Description**A. Purpose and Objective of Grant Amendment**

The purpose and Objective of the grant amendment is spelled out in detail in Exhibit A.

**B. Budget**

The budget that follows applies to activities conducted in the period September 17, 1978 - September 16, 1980.

Line Item	FR:9-17-78	FR:9-17-79	<u>Total</u>
	TO:9-16-79	TO:9-16-80	TO:9-16-80
1. Salaries	<u>\$ 86,980</u>	<u>\$ 88,880</u>	<u>\$175,860</u>
2. Fringe Benefits	15,656	15,998	31,654
3. Travel and Per Diem	17,000	17,000	34,000
4. Equipment	18,000	18,000	36,000
5. Materials and Supplies	13,040	13,048	26,088
6. Fellowships	11,000	11,074	22,074
7. Publications	<u>6,000</u>	<u>6,000</u>	<u>12,000</u>
Grand Total	\$167,676	\$170,000	\$337,676

The Grantee may not exceed in expenditures the funds obligated against the Budget. Adjustments among the line items are unrestricted.

**C. Special Provisions**

- Voucher Identification - The following identification data will appear on the face of every voucher submitted for payment:

Grant No.: AID/CM/ta-G-73-50  
 Project No.: 931-0154.11  
 Project Office: DS/AGR/FCP  
 Project Manager: John M. Yohe

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## Project Statement

### A. Project Summary

As our world has undergone its complex cultural evolution, many facts become evident. In view of current international unrest, energy problems and food shortages the fact which has become most evident is: no country or nation is an island unto itself. We (mankind) must direct our attention to problems which have a worldwide impact. The problem which most directly affects the largest percentage of the world's population is the shortage of food (for human consumption).

Malnutrition, caused by deficiencies in calories, protein and other nutrients affects an estimated 400 million to 1.5 billion of the world's poor. Hardest hit are children, whose growing bodies demand 2 1/2 times more protein, pound per pound, than those of adults. Nutrition experts estimate that 70 percent of the children in the low-income countries are affected. It is extremely difficult for a human being to work, think or smile when he or she is hungry and in a state of poor nutrition. Now and in the future a great deal of emphasis needs to be placed on the world food situation. Not only for humanitarian purposes, but to insure future world peace and stability.

Due to the lack of technology appropriate for their specific environmental, cultural and economic conditions, the world food picture does not present a pleasant outlook for many regions, especially in overpopulated areas of the tropics. However, through coordinated, international efforts in research and development, we can accomplish a great deal towards alleviating the problem.

Food legumes such as soybean (*Glycine max*), field bean (*Phaseolus vulgaris*), cowpeas (*Vigna sinensis*), pigeon pea (*Cajanus cajan*), and others will become

increasingly important in the tropical and subtropical regions of the world. All of these legumes provide an excellent source of inexpensive yet high quality vegetable protein. The potential production of many food legumes in the tropical and subtropical parts of the world has been clearly demonstrated. Recent research conducted by the University of Puerto Rico, University of Illinois and the Agricultural Research Service (USDA) has shown that the tropical production of soybean is feasible. Not only can the crop be grown throughout the entire year, but yields of 3 to 4 T/ha have been reported. This tonnage of seed is composed of 40 to 44% protein and approximately 20% oil.

The high yielding potential of many food legumes combined with vast amounts of potentially arable land which is not presently cultivated, tends to provide a bright outlook in terms of future food production in the tropics. However, when one reviews and observes the destructive potential of agricultural pests, the outlook is not so bright. The combined natural forces of plant disease (fungi, bacteria, virus, mycoplasma, and nematodes), insect pests, and weeds present a barrier against increased food production which is extremely difficult to overcome. This applies especially to the less developed regions of the tropics, where climatic conditions favor the continual growth and reproduction of organisms which are harmful to crops. Unless adequate crop protection measures are developed and applied, the use of high yielding cultivars combined with the potential to produce two or three crops a year will not be sufficient to meet the food requirements of the tropical countries.

The University of Puerto Rico has a long history in the production of food legumes such as pigeon peas, field beans, cowpeas and other tropical food crops. For research purposes the island of Puerto Rico is unique in that it offers an extremely wide range of climatic conditions. The annual rainfall

varies from over 381 cm to less than 76 cm. In addition, all major soils of the tropics are represented across the island. The University recognizes the importance of its tropical location and wide range of agricultural conditions in the development of plant improvement programs for the tropics. At Puerto Rico disease and insect control programs can be affected in place. In addition, research results can be obtained rapidly due to the fact that at least two crops can be produced per year.

The University was granted \$500,000 (AID/CM/ta-g-73-50) to cover the grant period of October 1, 1973 to September 30, 1978. The purpose of this grant is to strengthen the existing competence of the University of Puerto Rico to provide needed training, research and informational linkages, technical assistance and consultation on major problems related to limiting diseases and associated insects and cultural practices of soybeans and other food legumes for the tropical and subtropical areas. The developed competencies will be used to increase significantly tropical soybean production, with the intent of improving the human diet of the low income areas of the world.

This grant is a collaborative effort with the University of Illinois. The Universities of Illinois and Puerto Rico compliment each other with respect to developing an overall capability for conducting research and educational work on soybeans into the tropics. Illinois is the leading state in the union in soybean production. The University of Illinois has clearly demonstrated its interest and capabilities in conducting international research programs.

At the beginning of the present grant, soybeans were of no economic importance (as far as production is concerned) to the Commonwealth of Puerto Rico; therefore, Puerto Rico's research capability in soybeans was very low. Through activities conducted under the present grant, Puerto Rico has made significant progress towards the development of a coordinated,

interdisciplinary research program in the area of crop protection of soybean.

At present, Puerto Rico's soybean program (INTSOY-UPR) involves active research in the areas of plant pathology, weed science, and seed quality problems of soybean, as well as, other food legumes in the tropics. With emphasis on the development of an integrated, coordinated crop protection research and advisory team. A full-time plant breeder (INTSOY-University of Illinois) is an integral part of the present research program. Through the breeder's cooperation and consultation, the scope of our program is expanded to incorporate genetic variation of tropically adapted soybeans into the overall pest management and control program.

At present, no active research in the area of soybean entomology is being conducted within the program. The addition of an entomologist is essential in order to provide a well rounded program and research team in the area of crop protection.

Puerto Rico is strategically situated with respect to having a tropical climate. It provides an excellent base for conducting soybean research and educational work for subtropical and tropical conditions. Since Spanish is the first language, the staff can communicate effectively with people in Latin American countries. In addition, the administrators and scientists of the University of Puerto Rico at Mayaguez have expressed a strong interest in soybean research and education. The University is willing to develop a bridge to the LDCs, especially those in Latin America, for the transfer of knowledge in the production of soybean.

Puerto Rico's unique position climatically and language-wise is most important to future U.S. efforts to assist tropical countries in the production of soybean. Therefore, continuity of outside support for a soybean program in Puerto Rico should be maintained indefinitely.

The interest of the University of Puerto Rico and the University of Illinois in maintaining and participating in international soybean efforts is clearly demonstrated by the fact that together they constitute INTSOY (the International Soybean Program) which they established in July 1973.

## B. Research Purpose and Objectives

### 1. Purpose

The purpose of this grant, as stated in the original document, is to strengthen the existing competence of the University of Puerto Rico to provide needed training, research and informational linkages, technical assistance and consultation on major problems related to limiting diseases and associated insects and cultural practices of soybeans and other food legumes for tropical and subtropical areas of the world. It is a collaborative grant with the University of Illinois and will utilize the competence, leadership and facilities of the University of Puerto Rico and the University of Illinois.

Following the scheduled 18-month review of the grant program in June 1975, the statement of purpose was slightly modified. It was recommended by the review team that the University of Puerto Rico concentrate its efforts in the area of crop protection (disease, insect, nematode and weed control) of soybean under tropical conditions. At present, the University of Puerto Rico is continuing to develop a cooperative-interdisciplinary research and advisory team in the area of tropical crop protection of soybean. Research and training efforts are being focused on the production of high quality seed, and the control and management of diseases, weeds and insect pests of soybean. Major emphasis is on the development and dissemination of technology applicable to the small farmer, with the intention of increasing the quantity and quality of human food.

### 2. Objectives of the proposed Program

a. Grant objectives focus on the development and improvement of the

University of Puerto Rico's institutional response capability in the area of tropical crop protection and production of soybean. The grant emphasizes the development of background knowledge through research and informational linkages in order to provide training, technical assistance and consultation on major problems related to crop protection and production of soybean in the tropical regions of the world. The four major objectives (outputs) of the grant are:

(1) Improved education and training capability. Improvement of the University of Puerto Rico's educational and training capabilities in order to fully utilize and disseminate the knowledge and technology which is generated through the research program or obtained through informational linkages.

(2) Extended knowledge base and research capability. Development of mechanisms which make possible effective, interinstitutional, interdisciplinary research programs in the area of tropical crop protection and production of soybean. Emphasis is placed on the multidisciplinary (teamwork) approach toward solving the major problems related to soybean crop protection in the tropics.

(3) Increased advisory and consulting capability. Development of mechanisms which facilitate effective interdisciplinary advisory and consulting capabilities relative to crop protection and production of soybean in the tropics. Emphasis is placed on the development of a coordinated, interdisciplinary research and advisory team.

(4) Expanded research and informational linkages. Development of a world-wide network of linkages with institutions and individuals which are interested in developing soybean as an important crop for nutrition of human populations in the LDCs of the tropics.

## C. Significance and Rationale for the Program

### 1. The Development Problem

It is one of the major AID objectives to support research activities which will effectively accelerate agricultural and rural development in the less-developed countries. Within this framework, research and training activities aimed at the control and management of agricultural plant pests in order to reduce yield losses and increase food production is of particular interest to AID.

There appears to be considerable overlap between the objectives of AID and the University of Puerto Rico-Mayaguez. The University desires to further develop capabilities in working with LDCs of the tropics through increasing it's knowledge of their agricultural problems. The University of Puerto Rico intends to develop concepts and technology in the area of tropical crop protection of food legumes. Through the broadening of the Universities ability to work with and train individuals from LDCs in solving their own problems related to crop protection, the quality of life and nutrition of inhabitants of the LDCs will be improved.

In addition, through the presence and actions of the staff members involved in this project, the competence of the University of Puerto Rico in the area of crop protection will be strengthened.

### 2. State of the Arts

Most of the work published and research conducted in relation to soybean diseases, insect pests, and weed control is mainly from the temperate zones. Relatively little is known about diseases, insect pests, weeds, and seed quality problems affecting leguminous crops, particularly soybeans, in the tropics. In many instances basic information relating to these types of problems in the tropics does not exist. Rarely are specific economic control measures available to the farmer. When control recommendations are

available, the methodology of application is usually not adapted to the small farmer of the LDCs. In general, the information base which supports production of these crops is entirely inadequate.

A major portion of the information generated from this project will be new and, therefore, will directly expand our existing knowledge in these areas.

D. Plans to Develop Linkages and to Facilitate Utilization of Research Results.

1. Linkages

A network of worldwide linkages has been developed between INTSOY (UPR-Mayaguez-UIUC) and various national and international organizations. Establishment of such linkages is viewed as essential to the success of the proposed program. The network of linkages will provide a means for stimulating cooperative activities, ensure effective utilization of program outputs, and contribute to sustaining program activities after the contract period.

Visits by program personnel will focus on linked institutions in the LDCs of the tropics to improve staff awareness of their weed, disease and pest problems with soybeans and other food legumes.

Since the beginning of the grant, linkages have been developed with the following institutions:

- (a) International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India.
- (b) Centro Internacional de Agricultura Tropical (CIAT), Cali, Colombia.
- (c) Instituto Colombiano Agropecuario (ICA), Colombia.
- (d) Instituto Interamericano Ciencias Agrícolas (IICA), El Salvador, San Salvador.

- (e) Instituto Nacional de Investigaciones Agropecuarias (INIAP), Quito, Ecuador.
- (f) Universidad de Panama, Panama.
- (g) International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria.
- (h) Centro Internacional de la Papa (CIPQ, Lima, Peru.
- (i) Ministerio de Alimentacion, Lima, Peru.
- (j) Asian Vegetable Research and Development Center (AVRDC), Taiwan.
- (k) Fundacao Instituto Agronomico do Parana (IAPAR), Londrina, Brasil.
- (l) Canada Agriculture Research Station, Winnipeg, Manitoba.

The University of Puerto Rico's principle linkage within this program has been and will continue to be the University of Illinois. This project is closely coordinated with INTSOY research and training activities being conducted at the University of Illinois and in collaboration with scientists of the less developed countries.

Of primary interest to the University of Puerto Rico are the following programs and scientists: Dr. R. H. Goodman - Dr. Goodman has a strong program in the area of plant virology of soybean and other food legumes. Dr. Goodman is presently conducting research in Puerto Rico; Dr. James B. Sinclair - Dr. Sinclair has an active research program in the area of seed pathology of soybean. Dr. Sinclair is also involved in pathological studies concerning bacterial and fungal diseases of soybean; and Dr. M. Irvin - Dr. Irvin is presently conducting research in the area of integrated pest management programs for the control of insect pests. In addition, Dr. Goodman and Dr. Irvin are working cooperatively in the area of virus-vector relationships

of soybeans. Continued cooperative and coordinated research with the above mentioned INTSOY-based programs is essential to the continued development of the University of Puerto Rico crop protection program.

A Memorandum of Understanding exists between the University of Puerto Rico, Mayaguez Campus and the University of Illinois, with objectives to further develop cooperative and collaborative activities of common interest, including research and research related activities to meet human needs, to enlarge and strengthen capabilities and capacities of each university to promote student and faculty exchange and to facilitate the exchange of scholarly information and materials.

The program will work closely with the U. S. Agency for International Development, Office of Agriculture, Technical Assistance Bureau, Regional Bureaus and the AID Missions in cooperating countries for identification of problems, for establishment of contacts, conducting collaborative research, and use of research findings in extension programs oriented toward small farmers.

Other linkages within the United States which will be essential for the success of this research program include: Oregon State University - weed control; North Carolina State University - nematode control; Mississippi State University - seed technology and storage; and the Agricultural Research Service (ARS) - which has staff stationed at the Mayaguez Institute of Tropical Agriculture. Relationships with these institutions will be strengthened by cooperative research and educational efforts.

## 2. Dissemination and application of Results

Whenever INTSOY scientists visit countries to review, or investigate the possibility of establishing cooperative work, they will offer training opportunities by demonstration, seminar, or lecture to LDC research workers.

Concurrently they are made aware of current problems inhibiting production and protection efforts of soybeans and other grain legumes.

It is planned to direct the dissemination of expected research and present knowledge to officials, scientists, extension workers and the small farmer. The dissemination and utilization of information can be divided into the following areas:

Education and Training.

(a) Graduate studies. At present a M.S. degree with specialization in crop protection is being offered by the University. Currently, graduate students are conducting advanced studies and thesis research in the area of crop protection of soybean and other food legumes. An attempt will be made to increase the number of students from LDCs of the tropics for the M.S. program at UPR-Mayaguez who are willing to make use of this new option in the field of crop protection.

(b) Outreach (Extension-type) Training Program. Subsequent to determining requirements of selected LDCs from the tropics and UPR-Mayaguez capabilities in meeting their needs, short term outreach on-site training programs coordinated with University of Illinois and other organizations will be initiated for LDCs of the tropics. Detailed information on the LDCs, obtained through linkages and/or visits will be used to determine the LDCs that would benefit from such programs.

In addition, attempts will be made to give work-study type training to interested persons of the LDC, especially in Latin America. In this type of program interested and qualified persons could join the INTSOY-UPR staff for on-the-job training in a variety of areas in crop protection. This type of non-degree type training eliminates problems of prerequisites and language problems in relation to Spanish. In January 1978, a Peruvian student will begin a 6-month work study program in the area of soybean pathology.

(c) Seminars, workshops, conferences, and special courses coordinated between UPR-Mayaguez and UIUC will be implemented under this program. Other programs could include sabbatical leaves, faculty exchange and training between LDCs of the tropics and UPR-Mayaguez.

#### Advisory Capability

It is recognized that AID programs require an expert response capability in the area of weed, disease and pest control of soybeans and other food legumes for the LDCs of the tropics. Through this project UPR-Mayaguez will establish and maintain competence among its core staff to respond to AID, other donor, and LDCs of the tropics request for expert advice or assistance in the problem area. The function of advisors may include: problem identification and analysis, project design, project operations, including education, training, research, technical services and evaluation.

The fact that both Spanish and English languages are used by the faculty members and technical personnel especially qualify this university for work with LDCs of Latin America. The College of Agricultural Sciences, Mayaguez Campus, is in a unique position to provide for education and research of value for these areas.

A team of individual specialists will respond to requests for aid in disease control (fungus, bacteria and virus), insect control, nematode control and weed control. This team will work in a coordinated and cooperative effort with other specialists from the University of Illinois in similar areas or in areas such as plant breeding, agricultural engineering or soil sciences. Technical assistants, field and laboratory, and graduate students will be used to aid the staff's training capabilities. Appropriate specialists from state universities or other institutions will be sought in faculty exchange or for advice when needed.

Communications with interested individuals, institutions and governments will be continued by means of personal communications, the INTSOY Newsletter, and the INTSOY Publication Series. Planning will commence for the possible introduction of a series of technical bulletins. In addition, a comprehensive extension-type bulletin on the production and protection of soybeans in the tropics will be completed and made available to the LDCs by the end of the contract period.

**E. Management Considerations**

(By A.I.D. Program Manager)

**F. Project Background Description**

At the beginning of the present 211(D) grant, soybeans were of no economic importance (as far as production is concerned) to the Commonwealth of Puerto Rico; therefore, Puerto Rico's research and advisory capability in soybeans was very low. Through activities conducted under the present grant, Puerto Rico has made significant progress towards the development of a coordinated, interdisciplinary research and advisory program in the area of tropical crop protection of soybean.

At present, the University of Puerto Rico's soybean program (INTSOY-UPR) involves active research in the areas of plant pathology, weed science, and seed quality problems of soybean in the tropics. With emphasis on the development of an integrated, coordinated crop protection research and advisory team. Recently, Dr. Melia Acosta joined the (INTSOY-UPR) staff. Through research and advisory activities conducted by Dr. Acosta, nematology will become integrated into the overall program. Within the first year of a proposed grant extension, a full time INTSOY entomologist (PhD) will be employed by U.P.R. With the addition of the entomologist, the Puerto Rico program will become fully balanced in the area of tropical crop protection of soybean.

In addition to the U.P.R. staff, INTSOY-University of Illinois has three full time staff members permanently stationed in Puerto Rico. These staff members include a plant breeder (PhD), field agronomist (M.S.); and a soil microbiologist (PhD).

The grant has had a marked effect on the development of the University of Puerto Rico's plant sciences program. Grant staff members have been active in the development of a new curriculum for both the graduate and undergraduate programs within the new department of crop protection. The new curriculum is intended to meet the needs of the department in providing integrated training in all areas of crop protection. At present, 20 courses within the field of crop protection are being offered and 19 graduate students are enrolled in the program. Grant personnel are involved in teaching graduate and undergraduate courses in the areas of plant pathology, weed science, and nematology, as well as, advising graduate students.

The University of Puerto Rico will play an increasingly important role in international outreach and training activities. Efforts are being made to increase these types of activities, in order to more fully utilize the results of research and existing staff competence of the program. Within the last reporting period, the participation of program staff in international training activities has significantly increased. Program staff have participated in training and outreach activities in Brazil, Peru, Colombia, Puerto Rico, Ecuador, and Panama.

The present grant ends on September 31, 1978. At present, a proposal for a two year grant extension has been submitted to A.I.D. It is anticipated that the two year grant extension will carry the Puerto Rico program until funding becomes available under Title XII. In 1978, the University

a. Illinois and the University of Puerto Rico will submit a formal proposal for funding of INTSOY under Title XII.

Specific Accomplishments

a. Staff Development

Present INTSOY-UPR staff includes:

1. Dr. Guillermo Riveros - weed scientist
2. Dr. Pedro Meléndez - plant pathologist
3. Dr. Nelia Acosta - nematologist
4. Dr. Mike Ellis - plant pathologist  
seed pathologist
5. Eileen Rosario - Laboratory technician - plant pathology
6. Eduardo Riera - assistant weed science
7. Rafael Ruiz - assistant plant pathology
8. Papo Sanchez - field assistant

Dr. Raul Abrams is the associate director of INTSOY.

b. Training

Under the INTSOY-UPR program a student exchange program, between U.P.R. and U.I.U.C. has been in progress for over 3 years. The following UIUC graduate students have received research training and conducted thesis research at U.P.R.

Mr. William Grisley - Agr. Economics

Dr. Curtiss Nissley - Plant Breeding

Dr. Frank Tenne - Plant Pathology

Dr. Steve Foor - Seed Pathology

Mr. Glen Bowers - Plant Pathology

Mr. Pornpod Thongmeekom - Virology

The following UPR graduate students (staff members) received or are working towards the following degrees at U.I.U.C.

Dr. Jaime Jordon - PhD - Weed Science

Dr. Melia Acosta - PhD - Nematology

Mr. Arcangel Rodriguez - M.S. - Plant Pathology

Mr. Santos Valla - PhD - Plant Pathology

Dr. Julia Magnucci - PhD - Plant Pathology

Twelve graduate students representing Panama, Peru, Ecuador, Bolivia, Nicaragua and Colombia have received M.S. degrees at the University of Puerto Rico and were partially supported by this grant.

c. Facility Development

1. Plant Pathology Laboratory - on campus
2. Nematology Laboratory - on campus
3. Plant Pathology - Seed Pathology Laboratory - La Finca
4. Soil Microbiology Laboratory - La Finca
5. Office space and facilities - La Finca
6. Agronomy Field Laboratory and a variety of agricultural field and laboratory equipment - Isabela Substation
7. Cold storage facilities for seed - Isabela Substation
8. Scientific research equipment for all laboratories mentioned

d. Research Accomplishments

1. Production of high quality soybean seed under tropical conditions  
Research in this area has resulted in several recommendations for soybean seed production in the tropics.
2. Soybean seed storage under tropical conditions.  
Research in this area has resulted in a better understanding of the technology needed for soybean seed storage in the tropics and seed storage methods other than cold storage.
3. Soybean Breeding  
Research in this area is resulting in high yielding disease

resistant varieties of soybean which are adapted to the tropics.

#### 4. Soybean Nematology

Research in this area has just recently been initiated.

#### 5. Soybean Weed Science

Research in this area has resulted in several recommendations for chemical weed control under various environmental conditions.

A better understanding of the effects of weed competition on soybean yield and alternative weed control methods have also been developed.

#### 6. Soybean Plant Pathology

Research in this area has resulted in a better understanding of the pathological factors affecting soybean yields in the tropics.

Recommendations for controlling a variety of soybean plant pathogens are currently being developed.

Resistance to Soybean Mosaic Virus (SMV), Bacterial Pustule, Bacterial Blight and Cercospora leaf spot has been identified in Puerto Rico.

### G. Project Design and Methods

#### 1. Statement of Work

At the University of Puerto Rico, the College of Agriculture's International Soybean Program (INTSOY) will conduct research and training activities directed toward the development and utilization of effective crop protection methods for soybean in the tropics. Of major importance, will be the identification and development of soybean varieties with resistance and/or tolerance to the most destructive insects and diseases. The development and use of good disease and insect resistant varieties is the most direct method of helping the small farmer in the LDCs. Therefore, the plant breeder will be an integral part of the INTSOY research team at UPR. Much of the work conducted

by the weed scientist, entomologist, and plant pathologist will be in direct cooperation and coordination with the breeder. Whereas resistance is the ideal method of controlling plant pests, it may take several years to identify and incorporate disease and insect resistance into high yielding, tropically adapted lines. In addition, resistance is continually subject to being broken down through the development of new pathogenic races or biotypes. In view of the above mentioned factors, the University recognizes the importance of an overall crop protection program. Research will be continued and/or initiated in the following areas of weed, insect and disease control:

- (1) Problem assessment, with emphasis on identifying the most destructive pests in the tropics and determining their damage thresholds in order to minimize pesticide usage;
- (2) The use of integrated agronomic and cultural practices in reducing yield losses to weeds, insects and disease;
- (3) Biological control; and
- (4) Chemical control, with emphasis on minimal dosage chemical control methods as a portion of the overall pest management program.

In order to fully utilize the technology which evolves from the research program, the University recognizes the importance of outreach and training activities which are directed at the LDCs of the tropics. Activities conducted under this grant will emphasize the continued development of B.S. and M.S. programs at U.P.R. in the area of crop protection, work-study training programs, and staff participation in short courses, workshops and seminars.

## 2. Method of Work

Work under this grant will continue to feature the interdisciplinary,

coordinated, interinstitutional approach. The project will sustain and improve the University of Puerto Rico's research and training competence in tropical crop protection and production of soybean and improve communications with appropriate institutions in the U.S. and abroad. The primary thrusts will be:

1. Improvement of the Universities understanding of present and proposed research in soybean production and protection in the tropical LDCs.
2. Development of mechanisms which facilitate effective interdisciplinary and interinstitutional research on problems related to soybean production and protection in tropical LDCs.
3. Dissemination of research results to LDC and international institutions with special emphasis, where appropriate, on methods of adaptive research to speed the benefits of research to small farmers and agricultural institutions of tropical LDCs.

### 3. Objectives and Achievement of Objectives

The overall objective of this program is to expand and disseminate the information on pest control and management of soybeans under tropical conditions in order to increase the quantity and quality of human food.

Specific goal-oriented activities will be undertaken for each objective in accordance with the method of work described above.

Objective 1. Improved education and training capability. Improvement of the University of Puerto Rico's educational and training capabilities in order to fully utilize and disseminate the knowledge and technology which is generated through the research program or obtained through informational linkages.

#### A. Graduate Studies

Grant personnel will continue to cooperate in the development of the newly founded department of crop protection. Grant personnel are currently serving on a committee to evaluate and improve the present curriculum in the area of crop protection.

All grant personnel will teach one class per year in their area of specialization. This will give depth to the departments' curriculum and will insure UPR's capability of providing training at the B.S. and M.S. level in crop protection.

All grant personnel will be available for advising graduate students at the M.S. level.

Two graduate assistantships in the area of tropical crop protection of soybean will be offered per year to qualified students from tropical LDCs.

Program facilities and funding will be available for supporting graduate student research in the area of tropical crop protection of soybean.

#### B. Work-Study Training Program

In recent years, a number of requests have been made for short term non-degree training programs in the area of tropical crop protection and production of soybean. In this type of program, interested and qualified persons will join the INTSOY-UPR staff for on-the-job training in a variety of areas in crop protection. This type of non-degree training eliminates problems of academic prerequisites and language problems in relation to Spanish. At present, trainees from any Spanish speaking country can come directly to Puerto Rico with no language problems. Work-study training programs will be made available (when feasible) upon request to interested LDCs.

#### C. Participation in short courses, workshops and seminars

Program staff have been active participants in all relevant workshops, short courses, and seminars. The participation of program personnel in

these types of activities will be supported by the grant.

As LDC needs dictate, workshops, short courses, and seminars will be provided under the proposed program.

Objective 2. Extended knowledge base and research capability. Development of mechanisms which make possible effective, interinstitutional, interdisciplinary research programs in the area of tropical crop protection and production of soybean. Emphasis is placed on the multidisciplinary (teamwork) approach toward solving the major problems related to soybean crop protection in the tropics.

A. Screening tropically adapted soybeans for insect and disease resistance, and highly competitive characteristics against natural weed populations.

INTSOY's Variety Experiment Program and competence in the area of plant breeding has provided and will continue to provide a base for further research to screen the soybean germplasm for disease and insect resistance under tropical conditions. The U.S.D.A. tropical soybean germplasm is currently being maintained by the INTSOY plant breeder at the Isabela substation, Isabela, Puerto Rico. In addition to the U.S.D.A. collection, the breeder has obtained a number of additional lines which puts the present collection at approximately 600 lines. Sources of resistance to soybean mosaic virus (SMV) have already been identified in the collection. Experiments have been initiated to determine the competitive ability of certain soybean genotypes against natural weed populations. A screening program for good seed quality characteristics and resistance to seed-borne fungi has also been initiated. The results of all (INTSOY) screening work which has been conducted at UPR are very encouraging.

Under this project, work which has been initiated will be continued and expanded, and other screening programs for specific types of resistance will be initiated.

B. Research on seedborne microorganisms associated with soybeans and other food legumes, the pathogenicity of various isolated organisms, their role in reducing seed germination and field emergence, and methods of their control in the tropics.

Work on seedborne diseases affecting soybeans in the tropics has been in progress for the past 3 years at the University of Puerto Rico. Considerable progress has been made in the following areas: (1) Screening for resistance to seedborne fungi; (2) chemical control of seedborne pathogens; and (3) the identification of certain agronomic practices which aid in the reduction of seed infection by fungi in the field. Work in the above mentioned areas will be continued and expanded under this project.

Research on the nature of microorganisms associated with soybeans and the mechanism of seed or embryo death has been a concern of INTSOY pathologists for many years. Dr. James B. Sinclair has a strong program in the area of soybean seed pathology at UIUC. Current and future work at UPR will be closely coordinated with Dr. Sinclair's groups.

The major emphasis of the INTSOY-UPR seed pathology and seed quality program is and will continue to be the tropical production of high quality, disease free seed for planting and for food.

C. Research on the nature, effect on yield, and control of selected fungal, bacterial and nematode diseases of soybean in the tropics.

Work on diseases affecting soybeans in the tropics will take the following steps: (1) Identify the limiting soybean diseases in the tropics and subtropics; (2) generate basic information about soybean pathogens that can be used to predict their spread and importance; (3) devise methods which are applicable to the small farm level for controlling or reducing the impact of diseases; and (4) assist in breeding tropically adapted soybean cultivars with resistance to

important pathogens.

D. Identification and study of characteristics of weed species commonly associated with soybeans in the tropics, and to develop and apply methods for their control.

Research on the competitive ability of weed populations against soybean production has been in progress for the past two years at the University of Puerto Rico. Variations in the degree to which soybean yields are reduced by weeds have been observed and recorded. This variation appears to depend on weed species involved, amount of weeds (population), cultural practices being used, and climatic conditions. Work in this area will be continued and expanded under this proposal in order to determine which weed species present the greatest danger to soybean production in the tropics, and to relate their growth characteristics with their competitive ability against soybean. In addition, the behavior of weeds toward variations in cultural practices will be studied.

A number of herbicides have been studied over the past two years for their selectivity to soybean and their ability to control tropical weed pests of soybean. The behavior of these herbicides has been observed over a variety of soil types and weed populations. Although no products are completely effective for all environmental conditions and weed species, some are very effective for specific conditions and weed species. Future work with herbicides will be focused on determining and applying the proper methodology for using herbicides in the overall weed management program.

The use of various agronomic practices in controlling weed pests, as well as, mechanical and manual methods of weed control will be studied. Of primary concern, will be their methodology and application within the overall soybean production program in the tropics.

E. Research on limiting insect pests of soybeans in the tropics

Special attention will be given to the control of major soybean insects. This will include biological and genetic control methods as well as minimal dosage-chemical control methods. Damage thresholds will be studied for important insect pests, with emphasis on minimizing insecticide requirements through the development and application of pest management systems and programs. Under this project an entomologist (full-time - PhD) will be obtained. The INTSOY-UPR entomologist will be closely coordinated with the plant breeder and the INTSOY-UIUC entomologist.

It is anticipated that the Illinois Pest Management Guidelines will be adapted to conditions in Puerto Rico. This will be the first step in the eventual adaptation of the Guidelines for Tropical LDCs.

F. Research to test the feasibility of transferring specific knowledge in the area of crop protection of soybean to other food legumes and vice-versa.

Research in this area has already been initiated by INTSOY-UPR. At present, the area of seed pathology and seed production is being studied. Preliminary data suggests that if suitable practices are developed for the control of seed-borne microorganisms of soybeans, these same practices give identical or very similar results when directly applied to other tropical food legumes. If results from present experiments continue to be favorable, the theory of transfer of technology will be applied to other areas of crop protection of tropical food legumes.

Objective J. Increased advisory and consulting capability. Development of mechanisms which facilitate effective interdisciplinary advisory and consulting capabilities relative to crop protection and production of soybean in the tropics. Emphasis is placed on the development of a coordinated, interdisciplinary research and advisory team.

It is recognized that AID programs require an expert response capability in the area of weed, disease and pest control of soybeans and other food legumes for the LDCs of the tropics. Through this project UPR-Mayaguez will establish and maintain competence among its core staff to respond to AID, other donor, and LDCs of the tropics request for expert advice or assistance in the problem area. The function of advisors may include: problem identification and analysis, project design, project operations, including education, training, research, technical services and evaluation.

The fact that both Spanish and English languages are used by the faculty members and technical personnel especially qualify this university for work with LDCs of Latin America. The College of Agricultural Sciences, Mayaguez Campus, is in a unique position to provide for education and research of value for these areas.

A team of individual specialists will respond to requests for aid in disease control (fungus, bacteria and virus), insect control, nematode control and weed control. This team will work in a coordinated and cooperative effort with other specialists from the University of Illinois in similar areas or in areas such as plant breeding, agricultural engineering or soil sciences. Technical assistants, field and laboratory, and graduate students will be used to aid the staff's training capabilities. Appropriate specialists from state universities or other institutions will be sought in faculty exchange or for advice when needed.

Communications with interested individuals, institutions and governments will be continued by means of personal communications, the INTSOY Newsletter, and the INTSOY Publication Series. Planning will commence for the possible introduction of a series of technical bulletins. In addition a comprehensive extension-type bulletin on the production and protection of soybeans in the tropics will be completed and made available to the LDCs by the end of the

contract period.

**Objective 4. Expanded research and informational linkages.** Development of a worldwide network of linkages with institutions and individuals which are interested in developing soybean as an important crop for nutrition of human populations in the LDCs of the tropics.

A network of worldwide linkages has been developed between INTSOY (UPR-Mayaguez-UIUC) and various national and international organizations. Establishment of such linkages is viewed as essential to the success of the proposed program. The network of linkages will provide a means for stimulating cooperative activities, ensure effective utilization of program outputs, and contribute to sustaining program activities after the contract period.

Visits by program personnel will focus on linked institutions in the LDCs of the tropics to improve staff awareness of their weed, disease and pest problems with soybeans and other food legumes.

(See Section D-1 - Plans to develop linkages and to facilitate Utilization of Research Results)

#### **H. Plan of Work**

Since the inception of this grant first priority has been given to the development of a strong research program and the establishment of education and training facilities and staff in the area of tropical crop protection of soybean and other food legumes. This priority ranking will be slightly changed. Future program emphasis will be placed on the utilization of developed institutional response capabilities in development programs.

The continuation of the on going research program will maintain a position of high priority in the last year of the grant. The maintenance of a high quality research program provides the following primary functions:

- 1) the development of needed technology in the area of tropical

- crop protection of soybean,
- 2) the continued development of staff expertise and knowledge in the problem area; and
  - 3) the demonstration of UPR/MC institutional response capability in the problem area.

Included for funding in the grant redesign, which was not approved by A.I.D., was program expansion in the area of entomology and nematology. The area of entomology continues to be of primary interest to future program development at UPR/MC. At present, UPR/MC has developed significant response capability in the areas of plant pathology, weed science and seed pathology. When entomology and nematology are included into the grant program, a well-rounded tropical crop protection research, advisory and training team will be established. UPR/MC will be ready and capable of responding to most requests for aid in tropical crop protection of soybeans. Funding for the entomology component of this program is currently being sought from A.I.D. through this proposal for a two year extension of the grant. Estimated expenditures for the proposed entomology component are listed under Output 1, Program subcategory 5 of the attached individual work plans. A job description for an INTSOY entomologist at UPR/MC has been written.

Continued development and maintenance of facilities for research and training will receive program support and funding. Of special interest to this program, is the establishment and continued development of the newly founded Department of Crop Protection.

Two graduate assistantships per year will be provided under the proposed grant extension. Full program support will be made available to pertinent graduate student research which is not supported under assistantship.

Continued development of research and informational linkages will be supported. In all grant related activities, our primary linkage with UIUC will be continued. UIUC has truly distinguished itself as the leading institution in world soybean development. Through cooperation and planning with UIUC and other linked institutions and organizations, the basis for a truly international network of organizations and individuals which can sustain future soybean development programs for the tropics has been developed.

As funding permits, all requests for assistance from LDCs will be answered.

The development of literature (in Spanish and English) based on current knowledge and results from program research will receive funding.

1. Summary work plan by objective, activity and cost for Year I and II of the proposed extension.

	Year I		Year II	
	Activity	Objective	Activity	Objective
Objective I--Expanded knowledge base and research capability		\$124,676		\$126,926
A-1 Seed pathology and production of high quality seed	\$27,551.52		\$28,051.52	
A-2 Plant Pathology of Soybean under tropical conditions	22,420.00		22,920.00	
A-3 Weed Science	32,860.00		33,360.00	
A-4 Tropical Nematology of Soybean	12,000.00		12,250.00	
A-5 Tropical Entomology of Soybean	29,844.48		30,344.48	
(to be incorporated in year 1 of proposed grant extension)				

Note: Expenditures listed under Objective 1 include salaries and fringe benefits for all grant personnel except the grant program director and secretary. Salaries of the program director and secretary are included under Objective III

## Advisory Capacity.

	<u>Year I</u>		<u>Year II</u>	
	<u>Activity</u>	<u>Objective</u>	<u>Activity</u>	<u>Objective</u>
Objective II--Education and training		\$13,000.00		\$13,074.00
Continued development of training and education capacity within the Department of Crop Protection				
UPR/MC	\$1,000.00		\$1,000.00	
A-2 Graduate assistantships	11,000.00		11,074.00	
A-3 Travel and support for work-study training program	1,000.00		1,000.00	
Objective III--Advisory Capacity		16,000.00		16,000.00
A-1 Maintenance and continued development of staff personnel which can act as an advisory team in tropical Crop Protection of soybean	9,000.00,		9,000.00	
A-2 Travel in response to requests, for aid in development	7,000.00		7,000.00	
Objective IV--Information Capacity		6,000.00		6,000.00
A-1 Publishing of grant supported research results and other grant supported publications	6,000.00		6,000.00	
Objective V--Linkages and Networks		8,000.00		8,000.00
A-1 Travel	5,000.00		5,000.00	
A-2 Administrative and research support	3,000.00		3,000.00	
Total Year I	\$167,676.00		Total Year II	\$170,000.00

2. Individual work plans by objective and activity for Year I and II of the proposed extension.

WORK PLANS FOR UNIVERSITY OF PUERTO RICO 211(d) GRANT--

DEVELOPING RESPONSE CAPABILITY IN SOYBEANS FOR LDCs OF TROPICS AND SUBTROPICS

Output No. I \_\_\_\_\_

Program subcategory No. I Activity Seed pathology and the production of high quality seeds under tropical conditions.

Staff to be involved Seed pathologist, plant pathologist, plant breeder and laboratory technician.

Scheduled events Continued development and application of needed technology in the area of tropical production of high quality disease-free seed.

Expected results A significant increase in knowledge and training capability in the problem area.

<u>Costs</u>	<u>Year I</u>	<u>Year II</u>
Personnel	\$21,551.52	\$22,061.00
Travel	2,000.00	2,000.00
Research support	4,000.00	4,000.00
Subcategory total	27,551.52	28,051.52

WORK PLANS FOR UNIVERSITY OF PUERTO RICO 211(d) GRANT--

DEVELOPING RESPONSE CAPABILITY IN SOYBEANS FOR LDCs OF TROPICS AND SUBTROPICS

Output No. I Expanded Knowledge Base and Research Capability

Program subcategory No. II Activity Plant pathology of soybean under tropical conditions.

Staff to be involved Plant pathologist, seed pathologist, plant breeder and one full-time technician.

Scheduled events Continued identification of soybean diseases present in Puerto Rico. Screening tropically adapted soybean cultivars for resistance to selected foliar and root rotting diseases.

Expected results Identification of soybean germplasm with resistance to selected plant diseases.

<u>Costs</u>	<u>Year I</u>	<u>Year II</u>
Personnel	\$15,420.00	\$15,920.00
Travel	2,000.00	2,000.00
Research support	5,000.00	5,000.00
Subcategory total	22,420.00	22,920.00

WORK PLANS FOR UNIVERSITY OF PUERTO RICO 211(d) GRANT--

DEVELOPING RESPONSE CAPABILITY IN SOYBEANS FOR LDCs OF TROPICS AND SUBTROPICS

Output No. I Expanded Knowledge Base and Research Capability

Program subcategory No. III Activity Weed science-control and study  
of weed species commonly associated with soybeans in the tropics.

Staff to be involved Weed scientist, one full-time technician and  
plant breeder.

Scheduled events Continued research in methods of controlling weeds  
in soybeans under tropical conditions, and competitive ability of  
common weed species against soybean.

Expected results Significant increase in knowledge and training  
capability in tropical weed control in soybean.

<u>Costs</u>	<u>Year I</u>	<u>Year II</u>
Personnel	\$25,860.00	\$26,360.00
Travel	2,000.00	2,000.00
Research support	5,000.00	5,000.00
Subcategory total	32,860.00	33,360.00

## WORK PLANS FOR UNIVERSITY OF PUERTO RICO 211(d) GRANT--

## DEVELOPING RESPONSE CAPABILITY IN SOYBEANS FOR LDCs OF TROPICS AND SUBTROPICS

Output No. I Expanded Knowledge Base and Research CapabilityProgram subcategory No. IV Activity Tropical nematology of soybeanStaff to be involved Nematologist and plant pathologist.

Scheduled events Initiation of research on the effect of nematodes on tropical soybean production, and methods for their control. Development of research and training facilities in tropical nematology.

Expected results Development of institutional response capability in the area of tropical nematology of soybean.

<u>Costs</u>	<u>Year I</u>	<u>Year II</u>
Personnel	\$ 5,000.00	\$ 5,250.00
Travel	2,000.00	2,000.00
Research support	5,000.00	5,000.00
Subcategory total	12,000.00	12,250.00

## WORK PLANS FOR UNIVERSITY OF PUERTO RICO 211(d) GRANT--

## DEVELOPING RESPONSE CAPABILITY IN SOYBEANS FOR LDCs OF TROPICS AND SUBTROPICS

Output No. IProgram subcategory No. V Activity Tropical entomology of soybeanStaff to be involved UPR/MC entomologist (current not employed),INTSOY entomology staff at UIUC and plant breeder.

Scheduled events Development of a research program and institutional response capability in the area of entomology.. Development of pest management programs for soybeans in the tropics.

Expected results Development of institutional response capability in soybean entomology under tropical conditions.

<u>Costs</u>	<u>Year I</u>	<u>Year II</u>
Personnel	\$18,000.00	\$18,500.00
Travel	2,000.00	2,000.00
Research support	9,844.48	9,844.48
Subcategory total	29,844.48	30,344.48

WORK PLANS FOR UNIVERSITY OF PUERTO RICO 211(d) GRANT--

DEVELOPING RESPONSE CAPABILITY IN SOYBEANS FOR LDCs OF TROPICS AND SUBTROPICS

Output No. II Education and Training Capability

Program subcategory No., I Activity Education and training within the department of crop protection (UPR/MC). Graduate student research support and international work-study training program.

Staff to be involved All grant personnel and grant program director.

Scheduled events Continued teaching and graduate student advising on the part of all grant personnel. Support for pertinent graduate student research. Support for work-study trainees from Peru.

Expected results Continued development, and utilization of institutional response capability in the area of education and training of tropical crop protection.

<u>Costs</u>	<u>Year I</u>	<u>Year II</u>
Personnel	\$ --	\$ --
Travel	2,000.00	2,000.00
Other program support	11,000.00	11,074.00
Subcategory total	13,000.00	13,074.00

All grant personnel will be used in grant supported education and training activities as needed to meet program objectives.

## WORK PLANS FOR UNIVERSITY OF PUERTO RICO 211(d) GRANT--

## DEVELOPING RESPONSE: CAPABILITY IN SOYBEANS FOR LDCs OF TROPICS AND SUBTROPICS

Output No. III Advisory capacity

Program subcategory No. I Activity Maintenance and continued development of staff personnel which can serve as an international advisory team in the area of tropical crop protection of soybean.

Staff to be involved All grant personnel and grant program director.

Scheduled events Maintenance of present grant personnel and continued development of grant personnel. Special emphasis will be given to entomology and nematology.

Expected results The development of a well rounded advisory team in the area of tropical crop protection of soybean.

<u>Costs</u>	<u>Year I</u>	<u>Year II</u>
Personnel	\$ 9,000.00	\$ 9,000.00
Travel	7,000.00	7,000.00
Research support	--	--
Subcategory total	16,000.00	16,000.00

Salaries listed above included the grant program director 0.2 Fte and the program secretary 1.0 Fte. All grant personnel will be used in grant supported advisory activities as needed to meet program objectives.

## WORK PLANS FOR UNIVERSITY OF PUERTO RICO 211(d) GRANT--

## DEVELOPING RESPONSE CAPABILITY IN SOYBEANS FOR LDCs OF TROPICS AND SUBTROPICS

Output No. IV Information Capacity

Program subcategory No. I Activity Publishing of all research results obtained through this program. Funding of program publications in soybean protection under tropical conditions.

Staff to be involved All grant personnel and grant program director.

Scheduled events Publication of grant supported research results. Publication of extension-type bulletins related to the tropical crop protection of soybean.

Expected results Presentation (in English and Spanish) of significant program research findings and current knowledge in the area of tropical crop protection of soybean.

<u>Costs</u>	<u>Year I</u>	<u>Year II</u>
Personnel	\$ --	\$ --
Travel	--	--
Publication costs	6,000.00	6,000.00
Subcategory total	6,000.00	6,000.00

## WORK PLANS FOR UNIVERSITY OF PUERTO RICO 211(d) GRANT--

## DEVELOPING RESPONSE CAPABILITY IN SOYBEANS FOR LDCs OF TROPICS AND SUBTROPICS

Output No.  V   Linkages and networks

Program subcategory No.  I  Activity  Continued development of linkages with international research centers and other organizations. Linkages with tropical LDCs in the areas of research, education and training.

Staff to be involved  All grant personnel and the grant program director.

Scheduled events  Continued development of informational and research linkages with international organizations and LDCs institutions.

Expected results  The development of an international network of organizations and individuals which can sustain future soybean development programs in the tropics.

<u>Costs</u>	<u>Year I</u>	<u>Year II</u>
Personnel	\$ --.	\$ --
Travel	5,000.00	5,000.00
Other program support	3,000.00	3,000.00
Subcategory total	8,000.00	8,000.00



Objective and Activity	Percent of Total Effort	Month from start											
		2	4	6	8	10	12	14	16	18	20	22	24
<b>A-3 Weed Science</b>													
a) Weed competition studies				X	X	X	X			X	X	X	X
b) Evaluation of herbicides for specific environmental conditions.				X	X	X	X			X	X	X	X
c) Study of soybean varieties for competitive ability against weeds				X	X	X	X			X	X	X	X
d) Agricultural practices and weed control				X	X	X	X			X	X	X	X
<b>A-4 Tropical nematology of soybean</b>													
a) Determining nematode species associated with soybean in Puerto Rico			X	X	X	X	X			X	X	X	X
b) Pathogenicity testing of nematode species					X	X	X	X	X	X	X	X	X
c) Screening for resistance to pathogenic nematodes								X	X	X	X	X	X
<b>A-5 Tropical Entomology of soybean</b>													
a) Laboratory and facility development	X	X	X	X	X	X							
b) Use of chemicals within the pest management program effects on target and non-target species				X	X	X	X			X	X	X	X
c) Screening for resistance to foliar and seed feeding insects				X	X	X	X			X	X	X	X

Note: The distribution of work under Objective 1 is due to the date of planting in Puerto Rico. Soybeans will yield at any time during the year; however, maximum yield and vegetative growth is obtained when soybeans are planted from May 15 to July 1.



Objective and Activity	Total Effort	2	4	6	8	10	12	14	16	18	20	22	24
Objective 5--Linkages and Networks	10%												
A-1 Continued development and strengthening of existing research and information linkages		X	X	X	X	X	X	X	X	X	X	X	X

**I. Contractor Internal Management and Facilities**

**1. Local research organizations involved**

- a) University of Puerto Rico-Mayaguez Campus
- b) Agricultural Experiment Station of the University of Puerto Rico and all sub-stations.

**2. Available Facilities**

- 1. Plant Pathology Laboratory - on campus
- 2. Nematology Laboratory - on campus
- 3. Plant Pathology - Seed Pathology Laboratory -  
La Finca
- 4. Soil Microbiology Laboratory - La Finca
- 5. Office space and facilities - La Finca
- 6. Agronomy Field Laboratory and a variety of agricultural field and laboratory equipment - Isabela Substation.
- 7. Cold storage facilities for seed - Isabela Substation.
- 8. Entomology laboratory - on campus
- 9. Scientific research equipment for all laboratories mentioned.
- 10. Greenhouse - La Finca
- 11. Field space and research support at any of the 6 sub-stations of the Agricultural Experiment Station.

**J. Key Project Personnel and amount of salary charged to grant**

Principle Investigator: Dr. M. A. Ellis (50%)

Pathologist-seed production

Senior Investigators:

Dr. G. Riveros - Weed Scientist (100%)

Dr. P. Meléndez - Pathologist (50%)

Dr. N. Acosta - Nematologist (20%)

Dr. R. Abrams - Assoc. Dir. INTSOY (0%)

Entomologist (PhD) to be employed in

first year of grant (100%)

Curriculum vitae of senior personnel are attached as Appendix A.

**K. General Appraisal**

(AID Project Manager)

**L. Environmental Considerations**

(AID Project Manager)

Project Budget and Life-of-Project Cost Estimates

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<u>Inputs</u>	<u>Year I</u>	<u>Year II</u>	<u>Total</u>
Salaries	\$26,990.00	\$98,850.00	\$175,860.00
Fringe Benefits (18% of salaries)	15,656.00	15,998.00	31,654.00
Travel and per diem	17,000.00	17,000.00	34,000.00
Equipment	18,000.00	18,000.00	36,000.00
Materials and Supplies	13,040.00	13,048.00	26,088.00
Fellowships	11,000.00	11,074.00	22,074.00
Publication Costs	<u>6,000.00</u>	<u>6,000.00</u>	<u>12,000.00</u>
<b>Total Direct Costs</b>	<b>\$167,676.00</b>	<b>\$170,000.00</b>	<b>\$337,676.00</b>

<u>Outputs by objective</u>	<u>Year I</u>	<u>Year II</u>	<u>Total</u>
Objective 1--Expanded knowledge base and research capability	<u>\$49,489.00</u>	<u>\$51,814.00</u>	<u>\$101,303.00</u>
Objective 2--Education and training	13,000.00	13,074.00	26,074.00
Objective 3--Advisory capacity	<u>81,512.50</u>	<u>81,512.50</u>	<u>163,025.00</u>
Objective 4--Information capacity	<u>10,130.00</u>	<u>10,130.00</u>	<u>20,260.00</u>
Objective 5--Linkages	<u>13,507.00</u>	<u>13,507.00</u>	<u>27,014.00</u>
	<b>167,638.50</b>	<b>170,037.50</b>	<b>\$337,676.00</b>

LOGICAL FRAMEWORK		From FY _____ to FY _____	Total U.S. Funding _____	Date Prepared _____
Project Title & Number UPR-NC INTSOV - Response Capability in Tropical Crop Protection of Soybean				
NARRATIVE SUMMARY	OBJECTIVELY MEASURABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS	
<p><b>Program or Sector Goal:</b> The broader objective to which this project contributes:</p> <p>Increased tropical production of soybeans by small farmers of the LDCs through the development of technology and training activities in the area of tropical crop protection of soybean.</p>	<p><b>Measures of Goal Achievement:</b></p> <p>a. Increased number of LDC personnel with experience and expertise in tropical crop protection of soybean.</p> <p>b. Increased production and yield of soybeans in the LDCs of the tropics.</p>	<p>a. Increased number of LDC personnel which are directly linked to program research and training activities.</p> <p>b. Figures from tropical LDCs related to total national soybean production, number of hectares planted and yield per hectare.</p>	<p><b>Assumptions for achieving goal targets:</b></p> <p>a. Increasing interest and need of tropical LDC to produce soybeans.</p> <p>b. That soybean yields in the tropics can be significantly increased through the combination of improved technology in pest control and management, improved genetic technology, and improved agronomic practices.</p>	
<p><b>Project purpose:</b></p> <p>To continue to develop, mobilize, utilize and maintain a U.S. institutional response capability in tropical crop protection and production of soybean, utilizing the competence, leadership and facilities of the University of Puerto Rico - Mayaguez Campus and the University of Illinois - Urbana-Champaign, and focusing on the solution of LDC problems with emphasis on technology applicable to the small farmer and improving nutrition of the rural and urban poor.</p>	<p><b>Conditions that will indicate purpose has been achieved: End of project status:</b></p> <p>a. Recognition of UPR/NC as a center of excellence in research and training activities related to tropical crop protection and production of soybeans.</p> <p>b. Continuing and increasing demand for expertise and services from tropical LDCs, and increased response to requests.</p> <p>c. Increased tropical production of soybeans through the development and application of technology in the area of pest management and control.</p> <p>d. Integration of grant programs and activities into the mainstream of the UPR-NC.</p> <p>e. Adequate financing made available for sustaining the program.</p>	<p>a. Recognition by tropical and subtropical LDCs, and international soybean network</p> <p>b. Peer evaluation by other U.S. Universities, federal agricultural agencies, and national and international agencies.</p> <p>c. Use of expertise and services by LDCs, AID, and other national and international organizations.</p> <p>d. Annual and other reports.</p> <p>e. Other program support sources.</p>	<p><b>Assumptions for achieving purpose:</b></p> <p>a. Increasing demand for developed institutional response capability.</p> <p>b. Outputs will result in increasing institutional capacity.</p> <p>c. Complementary inputs from other related programs (special emphasis is placed on the INTSOV-University of Illinois program) and that the evaluation and use of outputs will generate increasing support for sustaining programs.</p> <p>d. That the specific assumptions under "Outputs" and "Inputs" are valid.</p>	

LOGICAL FRAMEWORK

From FY \_\_\_\_\_ to FY \_\_\_\_\_  
 Total U.S. Funding \_\_\_\_\_  
 Date Prepared \_\_\_\_\_

Project Title & Number **WPR-NC INTSOV - Response Capability In Tropical Crop Protection of Soybean**

NARRATIVE SUMMARY	OBJECTIVELY MEASURABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>Outputs:</b>                      Output 1. Improved education and training capabilities in tropical crop protection and production of soybean.</p>	<p><b>Magnitude of Outputs:</b>                      Graduate students at U.S. level in crop protection and production of soybean (2 per year supported by grant), others supported by national and international organizations.                      Increased number of faculty with tropical soybean expertise.                      Number of courses offered by WPR-NC in the area of tropical crop protection.                      Modifications of curricula and courses to facilitate a well rounded education in disease and insects in the area of tropical crop protection.                      Seminars, workshops, conferences regionally or nationally (1978 to 1980)                      Individual special training.</p>	<p>Number of graduate students with emphasis on tropical-subtropical soybeans (a) U.S., (b) from other countries.                       Number of faculty involved with graduate students and otherwise on tropical soybean protection and production.                       Sources of graduate student support.                       Number of faculty servicing requests for assistance from tropical-subtropical LDCs.                       Curricula and course modifications.                       Employment of completed graduate student.                       Requests for seminars, workshops, and conferences, and requests fulfilled.                       Evaluation of individual activities.                       Number of individuals in special training.</p>	<p><b>Assumptions for achieving outputs:</b>                      1. That increasing numbers of students from the U.S., Puerto Rico, and the LDCs of the tropics and subtropics will be interested in and supported for graduate study at WPR-NC in the various aspects of soybean protection and production so that WPR-NC and other national universities will have the capacity for these students.                       2. That LDC country personnel participation in short courses, seminars, workshops, conferences, and special training programs will be supported by a combination of USDA-AID training programs, USAID, foundations, and national and international agencies.</p>

**PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK**

Life of Project \_\_\_\_\_  
 From FY \_\_\_\_\_ to FY \_\_\_\_\_  
 Total U.S. Funding \_\_\_\_\_  
 Date Prepared \_\_\_\_\_

Proj - Title & Number UPR-NC INTSOV - Research Capability In Tropical Crop Protection of Soybean

NARRATIVE SUMMARY	CONCEPTUALLY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>Outputs:</b>                      Output II. Expanded knowledge base and research capability which emphasizes the development and application of technology in the area of tropical crop protection of soybean, with special emphasis on technology applicable to the small farmer in tropical LDCs.</p>	<p><b>Magnitude of Outputs:</b>                      Development of technology directed at controlling weeds, diseases and insect pests of soybeans in the tropics.                      Increased yield of tropically produced soybeans through the control of pest problems.                      Output in soybean production, protection, and use technology resulting from complementary SIRC 211(d) grant and SIRC-INTSOV AID research contract program.                      State of the arts studies in weed, disease and insect control of soybean under tropical conditions.                      Capacity to respond in English and Spanish to LDC requests through SOA Task Orders, GTS, or other arrangements, including capacity to provide rapid response to outbreaks of soybean production hazards.                      Identification and incorporation of disease and insect resistance into tropically adapted soybean cultivars.</p>	<p>Available technology in the area of tropical crop protection (pest control and management) of soybean.                      Completed state of arts studies.                      Requests for assistance from tropical LDCs and man months and other input resources indicating response to requests.                      Reduction or elimination of soybean crop losses due to selected pests.                      Introduction of new concepts in crop protection at the small farm level in tropical LDCs.                      High yielding, tropically adapted soybean cultivars with resistance to selected disease and insect pests.</p>	<ol style="list-style-type: none"> <li>1. That AID will support UPR-NC research on tropical crop protection of soybean.</li> <li>2. That AID will support SIRC research on soybean production, breeding, protection and use for tropical and subtropical areas.</li> <li>3. That UPR-NC and SIRC continue with the same integrated, coordinated, inter-institutional and multidisciplinary approach toward solving problems related to the tropical production of soybean.</li> <li>4. That resources become available for developing cooperating programs located at national and international centers strategically located in the tropics and sub-tropics.</li> </ol>

Project Title & Number <b>UPR-NC INTSOV</b> - Response Capability in Tropical Crop Protection of Soybean	<b>LOGICAL FRAMEWORK</b>		From FY _____ to FY _____ Total U.S. Funding _____ Date Prepared _____
	<b>NARRATIVE SUMMARY</b>	<b>OBJECTIVELY MEASURABLE INDICATORS</b>	<b>MEANS OF VERIFICATION</b>

			<b>IMPORTANT ASSUMPTIONS</b>
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<p><b>Program or Sector Goal:</b> The broader objective to which this project contributes:</p> <p>Increased tropical production of soybeans by small farmers of the LDCs through the development of technology and training activities in the area of tropical crop protection of soybean.</p>	<p><b>Measures of Goal Achievement:</b></p> <ol style="list-style-type: none"> <li>Increased number of LDC personnel with experience and expertise in tropical crop protection of soybean.</li> <li>Increased production and yield of soybeans in the LDCs of the tropics.</li> </ol>	<ol style="list-style-type: none"> <li>Increased number of LDC personnel which are directly linked to program research and training activities.</li> <li>Figures from tropical LDCs related to total national soybean production, number of hectares planted and yield per hectare.</li> </ol>	<p><b>Assumptions for achieving goal targets:</b></p> <ol style="list-style-type: none"> <li>Increasing interest and need of tropical LDCs to produce soybeans.</li> <li>That soybean yields in the tropics can be significantly increased through the combination of improved technology in pest control and management, improved genetic technology, and improved agronomic practices.</li> </ol>
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<p><b>Project Purpose:</b></p> <p>To continue to develop, mobilize, utilize and maintain a U.S. institutional response capability in tropical crop protection and production of soybean, utilizing the competence, leadership and facilities of the University of Puerto Rico - Mayaguez Campus and the University of Illinois - Urbana-Champaign, and focusing on the solution of LDC problems with emphasis on technology applicable to the small farmer and improving nutrition of the rural and urban poor.</p>	<p><b>Conditions that will indicate purpose has been achieved: End of project status:</b></p> <ol style="list-style-type: none"> <li>Recognition of UPR/NC as a center of excellence in research and training activities related to tropical crop protection and production of soybeans.</li> <li>Continuing and increasing demand for expertise and services from tropical LDCs, and increased response to requests.</li> <li>Increased tropical production of soybeans through the development and application of technology in the area of pest management and control.</li> </ol>	<ol style="list-style-type: none"> <li>Recognition by tropical and subtropical LDCs, and international soybean network</li> <li>Peer evaluation by other U.S. Universities, federal agricultural agencies, and national and international agencies.</li> <li>Use of expertise and services by LDCs, AID, and other national and international organizations.</li> </ol>	<p><b>Assumptions for achieving purpose:</b></p> <ol style="list-style-type: none"> <li>Increasing demand for developed institutional response capability.</li> <li>Outputs will result in increasing institutional capacity.</li> <li>Complementary inputs from other related programs (special emphasis is placed on the INTSOV-University of Illinois program) and that the evaluation and use of outputs will generate increasing support for sustaining programs.</li> </ol>
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	<ol style="list-style-type: none"> <li>Integration of grant programs and activities into the mainstream of the UPR-NC.</li> <li>Adequate financing made available for sustaining the program.</li> </ol>	<ol style="list-style-type: none"> <li>Annual and other reports.</li> <li>Other program support sources.</li> </ol>	<ol style="list-style-type: none"> <li>That the specific assumptions under "Outputs" and "Inputs" are valid.</li> </ol>
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PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:

From FY \_\_\_\_\_ to FY \_\_\_\_\_

Total U.S. Funding \_\_\_\_\_

Date Prepared \_\_\_\_\_

Project Title & Number UPR-NC INTSOV - Response Capability In Tropical Crop Protection of Soybean

narative Summary

OBJECTIVELY VERIFIABLE INDICATORS

MEANS OF VERIFICATION

Page 26  
IMPORTANT ASSUMPTIONS

Outputs:  
Output III. Expanded advisory and consultation capability in soybean production and protection to meet the needs of LDCs of the tropics and subtropics.

Magnitude of Outputs:  
Inventory of sources of individual and institutional soybean talent in U.S. and abroad by end of Year 2 of proposed grant extension.

System for registry of soybean talent.

Information supplied to individuals and organizations in the soybean network.

Availability of UPR-NC and UIUC-INTSOV core staff to respond to requests for aid from tropical LDCs in all aspects of soybean production and protection.

Capability of UPR-NC and UIUC-INTSOV core staff to respond in Spanish and English to LDC requests for AID.

Integrated and coordinated grant program under leadership of grant co-directors.

Development of talent registry system.

Numbers of individuals and institutions in registry.

Use of talent system registry by soybean network.

Use in providing personnel to meet needs of LDCs.

Numbers of staff with language capability in Spanish and English.

Numbers of staff involved in non-English-speaking LDCs assisting with soybean programs.

Release of information in non-English languages.

Months staff on release time.

Reports of accomplishments on release time by staff.

Overall review of grant program.

Assumptions for achieving outputs:

1. Cooperation of individuals and institutions in developing soybean talent registry.

2. Complementary inputs making developing, mobilizing, and maintaining U.S. soybean institutional response capability a viable part of the international soybean network to serve the tropical and subtropical LDCs.

**PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK**

Life of Project:  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Date Prepared \_\_\_\_\_

Project Title & Number WPR-NC INTSOV - Response Capability In Tropical Crop Protection of Soybean

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	Page No IMPORTANT ASSUMPTIONS:
<p><b>Outputs:</b> Output III. Expanded advisory and consultation capability in soybean production and protection to meet the needs of LDCs of the tropics and subtropics.</p>	<p><b>Magnitude of Outputs:</b> Inventory of sources of individual and institutional soybean talent in U.S. and abroad by end of Year 2 of proposed grant extension.</p> <p>System for registry of soybean talent.</p> <p>Information supplied to individuals and organizations in the soybean network.</p> <p>Availability of WPR-NC and UTUC-INTSOV core staff to respond to requests for aid from tropical LDCs in all aspects of soybean production and protection.</p>	<p>Development of talent registry system.</p> <p>Numbers of individuals and institutions in registry.</p> <p>Use of talent system registry by soybean network.</p> <p>Use in providing personnel to meet needs of LDCs.</p> <p>Numbers of staff with language capability in Spanish and English.</p>	<p><b>Assumptions for achieving outputs:</b></p> <ol style="list-style-type: none"> <li>1. Cooperation of individuals and institutions in developing soybean talent registry.</li> <li>2. Complementary inputs making developing, mobilizing, and maintaining U.S. soybean institutional response capability a viable part of the international soybean network to serve the tropical and subtropical LDCs.</li> </ol>
	<p>Capability of WPR-NC and UTUC-INTSOV core staff to respond in Spanish and English to LDC requests for AID.</p> <p>Integrated and coordinated grant program under leadership of grant co-directors.</p>	<p>Numbers of staff involved in non-English-speaking LDCs assisting with soybean programs.</p> <p>Release of information in non-English languages.</p> <p>Months staff on release time.</p> <p>Reports of accomplishments on release time by staff.</p>	
		<p>Overall review of grant program.</p>	

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**PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK**

**Project Title & Number** WPA-NC INTD07 - Response Capability In Tropical Crop Protection of Soybean

**Life of Project:**  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
**Total U.S. Funding** \_\_\_\_\_  
**Date Prepared** \_\_\_\_\_

Page No

**IMPORTANT ASSUMPTIONS**

**NARRATIVE SUMMARY**

**OBJECTIVELY VERIFIABLE INDICATORS**

**MEANS OF VERIFICATION**

**Outputs:**  
Output III. Expanded advisory and consultation capability in soybean production and protection to meet the needs of LDCs of the tropics and subtropics.

**Magnitude of Outputs:**  
Inventory of sources of individual and institutional soybean talent in U.S. and abroad by end of Year 2 of proposed grant extension.

System for registry of soybean talent.

Information supplied to individuals and organizations in the soybean network.

Availability of WPA-NC and UIUC-INTD07 core staff to respond to requests for aid from tropical LDCs in all aspects of soybean production and protection.

Capability of WPA-NC and UIUC-INTD07 core staff to respond in Spanish and English to LDC requests for AID.

Integrated and coordinated grant program under leadership of grant co-directors.

Development of talent registry system.

Numbers of individuals and institutions in registry.

Use of talent system registry by soybean network.

Use in providing personnel to meet needs of LDCs.

Numbers of staff with language capability in Spanish and English.

Numbers of staff involved in non-English-speaking LDCs assisting with soybean programs.

Release of information in non-English languages.

Months staff on release time.

Reports of accomplishments on release time by staff.

Overall review of grant program.

**Assumptions for achieving outputs:**

1. Cooperation of individuals and institutions in developing soybean talent registry.
2. Complementary inputs making developing, utilizing, and maintaining U.S. soybean institutional response capability a viable part of the international soybean network to serve the tropical and subtropical LDCs.

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LOGICAL FRAMEWORK

From FY \_\_\_\_\_ 19 FY \_\_\_\_\_  
 Total U.S. Funding \_\_\_\_\_  
 Date Prepared \_\_\_\_\_

Obj. Title & Number **WPA-NC 1978-80 - Soybean Capability in Tropical Crop Protection of Soybean**

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OBJECTIVE OUTPUT	OBJECTIVELY MEASURABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>Outputs:</b>                      Output IV. Expanded and strengthened linkages and networks among organizations and individuals with interests in tropical and subtropical soybean crop protection and production.</p>	<p><b>Magnitude of Outputs:</b>  <b>Genetic linkages</b>                      AIB-TAB, Regional Bureaus, seed and protein identifier:-- linkages to country missions, national and international organizations, program planning, implementation and evaluation.                      WPA--Joint program development and implementation.                      WPA-IBS--Northern and southern regional laboratories, Mayaguez Institute of Tropical Agriculture--program coordination, germplasm exchange, staff cooperation in country programs. Scientists at Beltsville and U.S. universities in research and outreach program.</p>	<p>WPA-AIB interactions in program development including TAB and Regional Bureau representatives.                      Joint involvement in research and outreach with crop protection and Caribbean, Central and South American emphasis.</p>	<p><b>Assumptions for achieving outputs:</b>                      That U.S., international, and LDC institutions will cooperate with WPA-NC in strengthening of linkages, exchanges, and visits by staff and students, information exchange, and other cooperative activities.</p>
	<p>U.S. universities--leading universities in soybean research and education; <u>Genetic System Institute</u>, Tennessee (nematology), North Carolina (rye rust nematology), South Carolina (entomology), California (seed production), Florida (breeding).                      Special problem areas: Mississippi State (weevil), Oregon State (weed).                      Private sector--input suppliers (seeds, inoculants, fertilizers, herbicides, fungicides, equipment).                      Feed and food processors.                      U.S. foundations--support for country and other programs.</p>	<p>Personnel involvement in germplasm exchange, research and outreach programs; joint projects; personnel participation in task orders.                      Personnel participation in tropical soybean development work cooperative and joint projects; greater institutional response capability in specialized areas as indicated by response to country requests.</p>	
		<p>Participation in network programs personnel involvement, programs, investments in tropical countries.                      Financial and program support.</p>	

LOGICAL FRAMEWORK

From FY \_\_\_\_\_ to FY \_\_\_\_\_  
 Total U.S. Funding \_\_\_\_\_  
 Date Prepared \_\_\_\_\_

Proj. Title & Number **USA-EC MEXICO - Research Capability in Tropical Crop Protection of Soybean**

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IMPORTANT ASSUMPTIONS

OBJECTIVE STATEMENT

OBJECTIVELY VERIFIABLE INDICATORS

MEANS OF VERIFICATION

Outputs:  
 Output IV. (continued)

Magnitude of Outputs:  
International linkages

Consultative Group for International Agricultural Research-- (CGIAR)-- cooperative work with international research centers and regional and country programs.

International centers with soybean programs--IITA, AVRDC.

Cooperative research and outreach, information exchange, faculty exchange, training programs graduate research.

International centers-cropping system programs--CIAT, CIMMYT, IRRI, etc., information exchange, graduate research, special soybean projects.

Multilateral organizations--FAO, ICP, IFAD, Regional banks-- resources for country programs, need and problem identification.

Support for USA-EC-UIUC INTSOV programs directly or through international research centers.

Memoranda of understanding and letters of agreement providing for specific projects; staff and graduate student involvement; cooperation on regional and international projects.

Support for regional and country programs; involvement in planning, implementation, and evaluation.

Integration of programs at regional and national levels.

Assumptions for achieving outputs:

That AID will encourage and support USA-EC UIUC as the leadership institutions in the international soybean network and will assist in developing and support cooperative research and outreach work on soybeans in cooperation with international research centers with soybean interests.

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PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Date Prepared \_\_\_\_\_

Proj. Title & Number W2-SC 212521 - Soybean Cerebellity in Tropical Crop Protection of Soybean

Page 3a

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Outputs: Output IV. (continued)</p>	<p>Magnitude of Outputs: <u>LDC linkages</u> AID Missions--need and problem identification, program planning and evaluation, information exchange, train-a identification, etc. <u>INTSOV Newsletter</u> Information exchange throughout international soybean network.</p>	<p>Country requests through USAID for assistance; SOA Task Orders and other soybean country projects; personnel participation in Output I programs.  Changes in content; requests for addition to mailing list from LDCs; recipient evaluation; contributions from various network entities.</p>	<p>Assumptions for achieving outputs:  That AID will assist in development and maintenance of linkages with the LDCs of the tropics and sub-tropics, in identifying training needs of institutions and individuals and locations for cooperative activities, and in exchange of information in the soybean network.</p>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Date Prepared \_\_\_\_\_

Project Title & Number USA-EC 211(4) - Response Capability in Tropical Crop Protection of Soybean

Page 4

NARRATIVE SUMMARY	OBJECTIVELY MEASURABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>Inputs:</b>  <b>Outline of activities to be financed:</b>            Graduate students supporting staff expertise development.            On-campus short courses            On-site short courses            Seminars, workshops, conferences            Special training            Support genetic technology development            Study of arts study of crop protection on small farms.            Support Talent Bank  <b>Inputs: training</b>            Information salary support            Publication preparation and delivery            Networks of U.S. institutions            Linkages of international organizations            IAC linkages            Support technology development in tropical crop protection.</p>			<p><b>Assumptions for providing inputs:</b>            a. That this 211(4) grant extension will be supported by AID for two years from October 1, 1970, and that funding under Title XII or other potential funding source be made available to support program activities by September 30, 1969.            b. That AID will support a complementary 211(4) grant to the University of Illinois, Urbana-Champaign with emphasis in development, mobilizing, and maintaining institutional response capability in soybeans with emphasis in soybean breeding production, and food usage.</p>

LOGICAL FRAMEWORK

Project Title & Number WFO-NC INTDOW - Response Capability In Tropical Crop Protection of Soybean

Form FT \_\_\_\_\_ No 11  
 Total U.S. Funding \_\_\_\_\_  
 Date Prepared \_\_\_\_\_

INDICATIVE OUTPUTS	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																																								
<p><b>Outputs:</b>                      1. Education and training program.                      2. Expanded knowledge base and research capability.                      3. Advisory and consultation capacity.                      4. Soybean linkages and networks.</p>	<p><b>Magnitude of Outputs:</b>                      1. See page 3                      2. See page 3a                      3. See page 3b                      4. See page 3c</p>	<p>1. See page 3                      2. See page 3a                      3. See page 3b                      4. See page 3c</p>	<p><b>Assumptions for achieving outputs:</b>                      a. LDC student interest and U.S. university capacity.                      b. Nongrant support for trainees.                      c. AID support for research                      d. Support of work at national and international centers.                      e. Network cooperation in talent registry.                      f. Complementary inputs to g.s.t.                      g. AID support for WFO-NC an. UIUC in network leadership rel..</p>																																								
<p><b>Inputs:</b>                      Student support to faculty. Short courses and other training activities.                      Soybean technology development in tropical crop protection.                      State of arts --- tropical crop protection.                      Publication preparation and dissemination.                      Talent bank, salary support.                      Soybean network and linkages.</p>	<table border="1"> <thead> <tr> <th>Inputs</th> <th>Year I</th> <th>Year II</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Salaries</td> <td>\$86,900</td> <td>\$80,000</td> <td>\$175,000</td> </tr> <tr> <td>Fringe</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Benefits (18% of salaries)</td> <td>15,654</td> <td>15,990</td> <td>31,654</td> </tr> <tr> <td>Travel and per diem</td> <td>17,000</td> <td>17,000</td> <td>34,000</td> </tr> <tr> <td>Equipment</td> <td>10,000</td> <td>10,000</td> <td>36,000</td> </tr> <tr> <td>Materials and supplies</td> <td>13,000</td> <td>13,000</td> <td>26,000</td> </tr> <tr> <td>Fellowships</td> <td>11,000</td> <td>11,074</td> <td>22,074</td> </tr> <tr> <td>Publication costs</td> <td>6,000</td> <td>6,000</td> <td>12,000</td> </tr> <tr> <td><b>Total Inputs</b></td> <td><b>\$167,676</b></td> <td><b>\$170,000</b></td> <td><b>\$337,676</b></td> </tr> </tbody> </table>	Inputs	Year I	Year II	Total	Salaries	\$86,900	\$80,000	\$175,000	Fringe				Benefits (18% of salaries)	15,654	15,990	31,654	Travel and per diem	17,000	17,000	34,000	Equipment	10,000	10,000	36,000	Materials and supplies	13,000	13,000	26,000	Fellowships	11,000	11,074	22,074	Publication costs	6,000	6,000	12,000	<b>Total Inputs</b>	<b>\$167,676</b>	<b>\$170,000</b>	<b>\$337,676</b>	<p>Records of UIUC and donor agencies.                      Reports, reviews, evaluations.</p>	<p><b>Assumptions for achieving inputs:</b>                      a. 211(d) support October 19 1 to September 1980.                      b. Complementary UIUC 211(d) support.                      c. Inputs from additional w. ....</p>
Inputs	Year I	Year II	Total																																								
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LOGICAL FRAMEWORK

From FY \_\_\_\_\_ 19 FY \_\_\_\_\_  
 Total U.S. Funding \_\_\_\_\_  
 Date Prepared \_\_\_\_\_

Project Title & Number UPR-NC INTSOY - Response Capability In Tropical Crop Protection of Soybean

NARRATIVE SUMMARY	OBJECTIVELY WRITABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>Program or Sector Goal:</b> The broader objective to which this project contributes:</p> <p>Increased tropical production of soybean by small farmers of the LDCs through the development of technology and training activities in the area of tropical crop protection of soybean.</p>	<p><b>Measures of Goal Achievement:</b></p> <p>a. Increased number of LDC personnel with experience and expertise in tropical crop protection of soybean.</p> <p>b. Increased production and yield of soybeans in the LDCs of the tropics.</p>	<p>a. Increased number of LDC personnel which are directly linked to program research and training activities.</p> <p>b. Figures from tropical LDCs related to total national soybean production, number of hectares planted and yield per hectare.</p>	<p><b>Assumptions for achieving goal (inputs):</b></p> <p>a. Increasing interest and support of tropical LDCs to produce soybeans.</p> <p>b. That soybean yields in the tropics can be significantly increased through the combination of improved technology in pest control and management, improved genetic technology, and improved agronomic practices.</p>
<p><b>Project Purpose:</b></p> <p>To continue to develop, mobilize, utilize and maintain a U.S. institutional response capability in tropical crop protection and production of soybean, utilizing the competence, leadership and facilities of the University of Puerto Rico - Mayaguez Campus and the University of Illinois - Urbana-Champaign, and focusing on the solution of LDC problems with emphasis on technology applicable to the small farmer and improving nutrition of the rural and urban poor.</p>	<p><b>Conditions that will indicate purpose has been achieved: End of project status:</b></p> <p>a. Recognition of UPR/NC as a center of excellence in research and training activities related to tropical crop protection and production of soybeans.</p> <p>b. Continuing and increasing demand for expertise and services from tropical LDCs, and increased response to requests.</p> <p>c. Increased tropical production of soybeans through the development and application of technology in the area of pest management and control.</p> <p>d. Integration of grant programs and activities into the mainstream of the UPR-NC.</p> <p>e. Adequate financing made available for sustaining the program.</p>	<p>a. Recognition by tropical and subtropical LDCs, and international soybean network.</p> <p>b. Peer evaluation by other U.S. Universities, federal agricultural agencies, and national and international agencies.</p> <p>c. Use of expertise and services by LDCs, AID, and other national and international organizations.</p> <p>d. Annual and other reports.</p> <p>e. Other program support sources.</p>	<p><b>Assumptions for achieving purpose:</b></p> <p>a. Increasing demand for development institutional response capability.</p> <p>b. Outputs will result in increasing institutional capacity.</p> <p>c. Complementary inputs from other related programs (special emphasis is placed on the INTSOY-University of Illinois program) and that the evaluation and use of outputs will generate increasing support for sustaining programs.</p> <p>d. That the specific assumption under "Outputs" and "Inputs" are valid.</p>

LOGICAL FRAMEWORK

From FY \_\_\_\_\_ to FY \_\_\_\_\_  
 Total U.S. Funding \_\_\_\_\_  
 Date Prepared \_\_\_\_\_

Project Title & Number **WPA-NC INTSOV**

Response Capability In Tropical Crop

Protection of Soybean

IMPERATIVE SUMMARY

OBJECTIVELY MEASURABLE INDICATORS

MEANS OF VERIFICATION

IMPORTANT ASSUMPTIONS

**Outputs:**  
**Output 1. Improved education and training capabilities in tropical crop protection and production of soybean.**

**Magnitude of Outputs:**  
 Graduate students at M.S. level in crop protection and production of soybean (2 per year supported by grant), others supported by national and international organizations.  
 Increased number of faculty with tropical soybean expertise.  
 Number of courses offered by WPA-NC in the area of tropical crop protection.

Modifications of curricula and courses to facilitate a well rounded education (weeds, disease and insects) in the area of tropical crop protection.

Seminars, workshops, conferences regionally or nationally (1978 to 1980)

Individual special training.

Number of graduate students with emphasis on tropical-subtropical soybeans (a) U.S. (b) from other countries.

Number of faculty involved with graduate students and otherwise on tropical soybean protection and production.

Source of graduate student support.

Number of faculty servicing requests (or assistance from tropical-subtropical LDCs.

Curricula and course modifications.

Employment of completed graduate students.

Requests for seminars, workshops, and conferences, and requests fulfilled.

Evaluation of individual activities.

Number of individuals in special training.

**Assumptions for achieving outputs:**

1. That increasing numbers of students from the U.S., Puerto Rico, and the LDCs of the tropics and subtropics will be interested in and supported for graduate study at WPA-NC in the various aspects of soybean protection and production as that WPA-NC and other national universities will have the capacity for these students.

2. That LDC country personnel participation in short courses, seminars, workshops, conferences, and special training programs will be supported by a combination of WPA-AID training programs, HEARD, foundations, and national and international agencies.

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:  
From FY 4 to FY 10  
Total U.S. Funding \_\_\_\_\_  
Date Prepared \_\_\_\_\_

Proj. Title & Number USP-NC INTSOY - Soybean Capability in Tropical Crop Protection of Soybean

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>Outputs:</b> Output 11. Expanded knowledge base and research capability which emphasizes the development and application of technology in the area of tropical crop protection of soybean, with special emphasis on technology applicable to the small farmer in tropical LDCs.</p>	<p><b>Magnitude of Outputs:</b> Development of technology directed at controlling weeds, diseases and insect pests of soybeans in the tropics. Increased yield of tropically produced soybeans through the control of pest problems. Output in soybean production, protection, and use technology resulting from complementary WISC 211(d) grant and WISC-INTSOY AID research contract program. State of the arts studies in weed, disease and insect control of soybean under tropical conditions. Capacity to respond in English and Spanish to LDC requests through SOA Task Orders, GTS, or other arrangements, including capacity to provide rapid response to outbreaks of soybean production hazards. Identification and incorporation of disease and insect resistance into tropically adapted soybean cultivars.</p>	<p>Available technology in the area of tropical crop protection (pest control and management) of soybean. Completed state of arts studies. Requests for assistance from tropical LDCs and non-monetary and other input measures indicating response to requests. Reduction or elimination of soybean crop losses due to selected pests. Introduction of new concepts in crop protection at the small farm level in tropical LDCs. High yielding, tropically adapted soybean cultivars with resistance to selected diseases and insect pests.</p>	<ol style="list-style-type: none"> <li>1. That AID will support USP-NC research on tropical crop protection of soybean.</li> <li>2. That AID will support WISC research on soybean production, breeding, protection and use for tropical and subtropical areas.</li> <li>3. That USP-NC and WISC continue with the same integrated, coordinated, inter-institutional and multidisciplinary approach toward solving problems related to the tropical production of soybean.</li> <li>4. That resources become available for developing cooperating programs located at national and international centers strategically located in the tropics and subtropics.</li> </ol>