

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

FOR AID USE ONLY  
**Batch 64**

1. SUBJECT CLASSIFICATION	A. PRIMARY Food production and nutrition	AF00-0336-0000
	B. SECONDARY Plant production--Oil crops--Soybean	
2. TITLE AND SUBTITLE Report of consultancy to the International Soybean Program (INTSOY)		
3. AUTHOR(S) Camacho, L.H.		
4. DOCUMENT DATE 1977	5. NUMBER OF PAGES 6p.	6. ARC NUMBER ARC
7. REFERENCE ORGANIZATION NAME AND ADDRESS Ill.		
8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)		
9. ABSTRACT		

10. CONTROL NUMBER <b>PN-AAE-029</b>	11. PRICE OF DOCUMENT
12. DESCRIPTORS Evaluation INTSOY? Puerto Rico Soybean	13. PROJECT NUMBER
	14. CONTRACT NUMBER AID/CM/ta-C-73-19 GTS
	15. TYPE OF DOCUMENT

REPORT OF CONSULTANCY TO THE INTERNATIONAL SOYBEAN PROGRAM, INTSOY

Date Submitted: August 10, 1977

NAME: Dr. Luis H. Camacho

TITLE: Food Legumes Breeder

PERIOD OF TRAVEL: July 27 to August 10, 1977

PURPOSE: To get acquainted with the work of INTSOY on the development of genetic technology for small farmers of the tropics and subtropics, and to review the soybean breeding work in Puerto Rico.

ITINERARY:

- July 27      Depart Tehran, 07.00 hours  
             Arrive Champaign, 20.59 hours
- July 28      Visit with Mr. Thomas A. McCowen to arrange the program of visits  
             with other staff members at Illinois and Puerto Rico.
- Discussions with Dr. R. M. Goodman, Dr. M. E. Irwin and Dr. M. Kogan  
             on virus diseases and insect pests of soybeans.
- Discussions with Dr. H. Minor on problems of growing soybeans in  
             tropical environments.
- July 29      Conference with Dr. W. N. Thompson on research, training and  
             international linkage activities of INTSOY.
- Visit with Dr. A. Harms for information on crop production problems  
             in Peru.
- Discussions with Dr. J. B. Sinclair on soybean seed pathology.
- Attended presentation of report on Peru visit by staff from the  
             School of Human Resources and Family Studies.
- Discussions with Professor A. I. Nelson and Dr. L. K. Ferrier on  
             direct utilization of soybeans for human food. Sampling of soybean  
             foods.
- July 30      Discussion with Dr. W. H. Judy on ISVEX and SPOT trials.
- Depart for Chicago.
- July 31      Depart for Mayaguez, Puerto Rico.

- August 1 Discussions with Dr. E. H. Paschal II and Dr. R. Stewart Smith on soybean nodulation problems. Preparation of schedule of visits in Puerto Rico.
- August 2 Discussions with Dr. E. H. Paschal II and visit to field plots at Isabela Substation.
- August 3 Trip to Fortuna and Lajas with Dr. Paschal to observe field plantings.
- August 4 Discussions with Dr. M. Ellis on soybean and grain legume diseases with special reference to seed pathology.
- August 5 Discussions with Dr. S. Smith and Dr. R. Smith on nodulation, N fixation and preparation of legume inoculants.
- Final discussions with Dr. E. H. Paschal on soybean breeding.
- August 6 Depart for Champaign; arrived at 22.30 hours.
- August 7 Report preparation.
- August 8 Visit with Dr. J. Jackobs; discussions on intercropping systems.
- Visit with Dr. W. Walker; information on his visit to Peru and problems associated with soybean production in the area visited.
- Visit with Dr. D. E. Alexander; discussions on problems and prospects of various oilseed crops.
- August 9 Conference with Dr. W. N. Thompson; wrap-up discussions on development of genetic technology for soybean production in tropical and subtropical environments.
- August 10 Conference with Dr. R. W. Howell; problems of soybeans in tropical conditions.
- Depart for Tehran .

#### FINDINGS AND RECOMMENDATIONS:

1. Research results on virus diseases of soybeans have provided useful information on (a) sources of genetic resistance to SMV, (b) aphid populations associated with spread of SMV, (c) transmission of Cowpea Mosaic Virus to soybeans by insect vectors. Breeding work has been started to transfer the resistance to SMV found in variety Buffalo to other varieties of soybean.
2. Seedborne microorganisms have been found to substantially reduce germination and emergence of soybeans. The fungus Phomopsis spp. appears the most important pathogen contributing to seed deterioration. Delaying harvest after maturity results in decreased seed germination and this appears to be correlated with increase in percentage of seed pathogens in susceptible varieties. Screening of germplasm has resulted in the identification of two tolerant varieties, PI 279.088 and PI 205.912, which are presently being crossed with other varieties to transfer the resistant characteristic.

Since timely harvest produces seeds with low percentage of seedborne pathogens and therefore with high germination potential, the result could find immediate application in developing countries of tropical regions where seed deterioration is a serious problem. Profuse circulation of these findings among soybean researchers of the LDC will be highly beneficial.

3. Other seed quality deterioration studies refer to the effect of different types of storage under simulated tropical conditions. Preliminary results indicate seeds with hard seed coat deteriorate less than seeds with normal seed coat.
4. Soybean varieties and lines from tropical countries will be assembled and planted at two locations in Puerto Rico for description of plant trials; selected materials will go into the SPOT scheme and finally to ISVEX trial.

It seems desirable that the characterization and initial screening of these materials be conducted at two different latitudes, rather than at two locations of the same latitude. Arrangements could be made to plant half of the seeds at IITA where the environment is more suitable for the expression of foliar diseases and pod shattering.

5. Proposals are being made to commit INTSOY resources for research on soil fertility and crop and soil management. A total of 17 research problems with broad application in tropical and semi-tropical areas is being proposed to be addressed by INTSOY scientists.

In addition to the 17, it would be desirable to consider problems on farming systems that include crop rotations, double cropping and mixed cropping. The latter system is very common in small farms of tropical latitudes.

6. The home and village level preparation of soy products was explained and samples of different foods were offered for tasting. The preparation of soy milk is based on the principle of enzyme inactivation and tenderization of beans followed by grinding, filtering, and cooking of the filtrate. Breakfast foods and fried patties are prepared by grinding raw beans followed by cooking, adding of flavoring ingredients, and cooking of the mixture. The process requires 25 minutes for breakfast foods and 35 minutes for fried patties (10 minutes for frying).

The process for preparing these soybean foods is easy to adopt since it does not require complicated equipment; extension programs of developing countries will find it easy to demonstrate in villages and rural communities.

7. The main purpose of the trip to Puerto Rico was to observe field plots and discuss with Dr. E. H. Paschal II the breeding work being conducted with tropical soybeans. Discussions were also held with Dr. M. Ellis on his work on seed pathology and seed quality studies, with Dr. S. Smith on rhizobium inoculation in soybeans, and with Dr. R. Smith, of the University of Puerto Rico, on rhizobium culture and inoculant carriers; a new carrier from the coconut fruit has been developed by Dr. R. Smith.

8. The INTSOY breeding work in Puerto Rico is devoted to developing improved varieties suitable for production under tropical and subtropical conditions. The need for developing these varieties arises from the fact that commercial U.S. varieties are adapted to temperate zones and do not reach satisfactory growth under short photoperiods of the tropical environments.
9. The breeding work presently carried out includes variety evaluation, selection in segregating populations, hybridization, and screening for disease and insect resistance. The programme is well organized and a close cooperation exists with other scientists in the areas of plant pathology, plant entomology and weed control.
10. The bulk of the breeding work is conducted at Isabela Substation. There is a nursery of about 300 varieties to study resistance to the insect pests pega pega (Hedylepta indicata) and velvetbean caterpillar (Anticarsia gematilis); some varieties showed less damage than others. In another nursery, the transmission of Cowpea Mosaic Virus to soybean varieties, by insect vectors mainly Ceratomyza spp is being studied. A large number of F<sub>2</sub> populations from crosses between promising tropical varieties were in this field. Three preliminary yield trials and the SPOT trial were also planted at Isabela this year; some of the lines in the yield trials have yielded up to 2.7 tons per hectare in previous seasons. The Hardee Late Selection line looked promising. Selection criteria in early generations include plant vigor, plant height, maturity, pod height above ground, lodging and shattering; all these traits appear to have moderate to high heritability, therefore their mean expression can be maintained through all generations before commencing yield tests.
11. At Lajas Substation the three preliminary yield trials were also planted; plant height and plant vigor looked better here than at Isabela, probably due to better soil conditions.
12. A field of about 12 acres is planted at Fortuna Substation with variety Improved Pelican. Plant stand and plant growth at the initial flowering stage looked satisfactory.
13. Some suggestions for the breeding program:
  - a. Consider the possibility of measuring harvest index in preliminary yield trials.
  - b. Consider the possibility of developing branching genotypes for tropical environments; the compensating effect of these genotypes under poor stand conditions may have some value in small farms of the tropics and subtropics.
  - c. Consider the possibility of developing determinant and indeterminate isolines and test their suitability under tropical and subtropical conditions. Determinant types could be useful under short growing seasons where irrigation is available or rainfall can be predicted accurately. Indeterminate types may be suitable for rained areas with erratic rainfall.

- d. Consider the possibility of developing varieties suitable for intercropping or mixed cropping with other food crops of the tropics like sorghum, maize or cassava.
- e. Consider the possibility of supplying heterozygous plant populations to some selected national programs of tropical and subtropical countries for selection under local conditions.

PERSONS CONTACTED:

Dr. W. N. Thompson, Director, INTSOY  
Dr. R. W. Howell, Head, Department of Agronomy, College of Agriculture,  
University of Illinois  
Mr. T. A. McCowen, Assistant Director, INTSOY  
Dr. R. M. Goodman, Assistant Professor, Plant Pathology  
Dr. J. B. Sinclair, Professor, Plant Pathology  
Dr. M. A. Ellis, Assistant Professor, Plant Pathology  
Dr. M. E. Irwin, Assistant Professor, Agricultural Entomology  
Dr. M. Kogan, Associate Professor, Agricultural Entomology  
Dr. H. C. Minor, Assistant Professor, Agronomy  
Dr. W. H. Judy, Associate Professor, Agronomy  
Dr. E. H. Paschal II, Assistant Professor, Agronomy  
Professor A. I. Nelson, Professor, Food Science  
Dr. L. K. Ferrier, Assistant Professor, Food Science  
Dr. A. G. Harms, Professor, Agricultural Economics  
Dr. R. Stewart Smith, Assistant Professor, Soil Microbiology  
Dr. R. Smith, Assistant Professor, Soil Microbiology, University of Puerto Rico  
Dr. J. Jackobs, Professor, Agronomy  
Dr. W. Walker, Professor, Agronomy  
Dr. D. E. Alexander, Professor, Agronomy