

ACTION MEMORANDUM FOR THE DIRECTOR

May 5, 1989

THROUGH: Paul E. White, DDIR




FROM: Christina H. Schoux, C/PDSO

SUBJECT: Biological and Socio-Economic Modelling of Bean-Based Farming Systems in Guatemala, 936-5542.21. Request for approval and authorization of a Limited Scope Grant Agreement.

PROBLEM: Your approval and authorization is requested for a three-year US\$150,000 limited scope grant agreement to the Institute of Sciences and Agricultural Technology (ICTA). This grant is fully funded by AID/SCI.

DISCUSSION: This project will develop a whole-farm simulation model for bean-based farming systems in Guatemala and identify appropriate technology for improvement of bean-based farming systems through application of the model.

BACKGROUND: The Instituto de Ciencia y Tecnologia Agricolas (ICTA) has historically played a lead role in the development of the Farming Systems Approach to agriculture research and extension and in the development of research methodologies. Under the USAID/S&T bean-cowpea CRSP and using a modified FSR approach, ICTA has also been active in developing and transferring new bean varieties to small landholding farmers in Guatemala.

ICTA has developed and presented, in conjunction with the University of Florida and the Edinburgh School of Agriculture, a research proposal for funding under USAID/SCI's Program in Science and Technology Cooperation (PSTC). This proposal, entitled "Biological and Socio-Economic Modelling of Bean-Based Farming Systems in Guatemala", was reviewed by an external panel of scientists and subsequently recommended for funding. The proposed research would develop a whole-farm simulation model to be used in testing the degree of generalization of site-specific research results to other areas where the

research results might also be applicable. The project will attempt to demonstrate the advantage of the use of valid simulation models over traditional experimentation, and the ability to assess technological packages across sites and over time.

PROJECT ACTIVITIES: The project's activities involve the collection and analysis of crop-based and socio-economic field data contributing to the development of a whole-farm simulation model of a bean-based farming system. The crops, soils and weather data bases will be used to develop and validate the crop simulation models, while the socio-economic data base will be used to formulate a region specific whole-farm simulation model. The computer model will be designed to run on PC microcomputers. A workshop will be held at the end of the research activity to demonstrate the use of the model for local scientists. A copy of the approved proposal, enclosed herewith as ANNEX C, is provided for reference and clarification for any question pertaining to any specific research activity, should the need arise.

Specific research components include the following:

1. Building a soils and weather data base: This activity includes the collection of historic rainfall and temperature data for the Jutiapa region, measurement of solar radiation at four locations within the same region, and testing of the weather generator model currently being used in the Decision Support System for Agrotechnology Transfer to determine its applicability for the Jutiapa region.

The soils data base will include soil characteristics of each farm, and in areas of highly variable soils, of each field. The data base will be defined on the basis of the newly collected soil profile characterizations, existing soils maps, soil characterization tables, and data from the international soils data base.

2. Collecting crop growth information: Data on vegetative and reproductive growth phases of beans, corn and sorghum grown under distinct monoculture and intercrop systems will be collected through a series of replicated, experiment-station based and on-farm field trials. Final yield data for both monoculture and intercropped plots will be collected for a large sample area to measure the interaction effects of the crops grown together. Data will be analyzed

statistically and will be used to define intercropping effects in the dry bean, corn, and sorghum growth models.

3. Validating the crop growth models for beans, corn, and sorghum with data collected from the Jutiapa region: After crop models have been calibrated and parameters have been defined for the various cultivars and land races under study, model predictions need to be verified and validated for the Jutiapa region. If model predictions are consistently biased, model adjustment will be made.

Model modifications will also be made to account for the intercropping of beans with corn, beans with sorghum, and a mixture of beans, sorghum, and corn. Similar modifications will also be made in the CERES-sorghum and Ceres-Maize model to account for the competition between corn and beans and sorghum and beans.

4. Construction of a socio-economic data base characterizing the Jutiapa region: Farm-level data will be collected on labor utilization and availability, farm size and structure, prices of inputs and products, household and discretionary consumption patterns, capital and credit availability and patterns of investment and disinvestment, household objectives and attitudes, and farm management and environmental characteristics. The data base will contribute to the development of a whole-farm simulation model and will be used in conjunction with the crop simulation models.
5. Building a whole-farm simulation model and validating it for the Jutiapa region: Once individual crop and whole farm models have been developed and validated, they will be integrated and run together. The results of the simulations will be compared with sets of constraints defined from the socio-economic data base to test whether selected management options are feasible within the environment of the resource-poor farmer. Various factors, including period of maturation, planting date, cultivar type, irrigation and other management alternatives will be tested against a range of socio-economic constraints within the whole-farm model.
6. Workshop: A workshop will be held at the start of year three to demonstrate the use of simulation models to interested groups of potential end-users of

information generated by the crop and whole-farm models. The workshop will emphasize the principal advantage of the use of valid simulation models over traditional experimentation, and the ability to assess technological packages across sites and over time.

ADMINISTRATIVE RESPONSIBILITIES: Mission responsibilities will comprise obligation, disbursement and reporting of funds, voucher certification and technical review of the reports generated, and PACR preparation all by ORD.

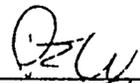
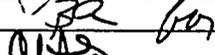
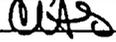
RECOMMENDATION: Per State 88998 paragraph two you are authorized to obligate this project. State 108027 confirms expiration of this Project's CN on April 4, 1988. It is recommended that you sign the attached Limited Scope Grant Agreement.

Approved: 
Anthony J. Cauterucci
Director, USAID/Guatemala

Disapproved: _____
Anthony J. Cauterucci
Director, USAID/Guatemala

Date: 5/10/89

Clearances:

DDIR, PEWhite	<u></u>	Date: <u>5/8/89</u>
CONT, JHill	<u></u>	Date: <u>5/8/89</u>
ORD, GStraub	<u></u>	Date: <u>5/8/89</u>
PDSO, CHSchoux	<u></u>	Date: <u>5/9/89</u>