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Semi-Annual Report

August 1987 - February 1988

Project: AID-PSTC #936-5542. Regulation of Drought Tolerance in Beans

Principle Investigator (PI): Jaleh Daie - Rutgers University

Honduran Collaborator: Silvio Zuluaga - EAP

Project Objectives:

- I. To monitor the genotypic variations in osmotic adjustment of beans under reduced soil water content.
- II. To determine the effect of soil amended minerals such as potassium and phosphorus in the onset and development of drought tolerance in beans.
- III. To determine the turgor regulation of sugar transport relative to osmotic adjustment and drought tolerance.

Proposed Activities for this Period:

This period was considered to be the initiation and setup phase. Our goal was to hire personnel, purchase equipment and supplies and plan experiments pertinent to the objectives of the project.

Accomplishments During this Period:

Rutgers: Award notification was not received until mid-August 1987, after which travel plans were developed for the PI to make a site visit to Honduras. After obtaining a scientific exchange visa, I visited Dr. Silvio Zuluaga at the Escuela Agricola Panamericana (EAP) in Zamorano in early December 1987. The purpose of the visit was to familiarize myself with the situation at EAP and Honduras to establish specific needs and priorities.

The design and the specifics of various experiments were planned, discussed and agreed upon. I visited several farmer fields in the

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southwestern, central, as well as northeastern sections of Honduras. In the southwest much (almost all) of the bean crops were lost to the drought. The sad situation provided us with the opportunity to observe serious losses in farmer fields and evaluate drought resistance of some cultivars planted at EAP plots. In the northeastern region, due to reasonable precipitation, the bean fields appeared to be more promising.

As part of the budgeting, we had proposed to train graduate students at Rutgers. While at EAP, I interviewed two students, both graduates of EAP as possible candidates. They were advised about the graduate programs at Rutgers and provided with application forms. Pending admission, the student will join Rutgers after graduation from EAP in June, 1988.

EAP. According to agreed upon goals, Dr. Zuluaga had identified student candidates before my arrival at EAP, and had performed the initial paper work for selection and ordering of major equipment and necessary supplies for the initiation of the project. In addition, he had prepared and arranged a well-balanced schedule for our meetings, farm visits, and meetings with various officials at EAP and the AID mission in Tegucigalpa. The schedule was carried out effectively mainly due to Dr. Zuluaga's careful arrangements prior to my visit.

Although this project was not funded until he had planted his plots, results from previous experiments on bean drought tolerance conducted by Dr. Zuluaga, proved to be very useful in the planning of our future experiments.

Special Considerations/Difficulties During this Period:

Despite the availability of excellent field facilities and a good soil and plant analysis laboratory (used also as a teaching lab), basic equipment for physiological studies were clearly lacking. Lack of equipment would cause major delays and may even result in the inability of EAP to achieve the proposed project goals. For this reason, Dr. Zuluaga made a special request to Rutgers to purchase a key equipment (Li-Cor 6200 Photosynthesis system) that was not included in the initial budget. Rutgers supports the request contingent upon his agreement that he provides funds for salaries and supplies from other sources available to him (see attached letter of December 1, 1987).

Proposed Goals for the Second Period of the First Year:

With the successful completion of the initial phase, we hope to start the following experiments during the upcoming growing season.

Rutgers. In relation to the goals stated in Objective I, we will conduct a series of experiments to evaluate osmotic adjustment of several lines of beans. We will compare response of common beans (P. vulgaris) with that of tepary bean (P. acutifolius) which is known to have a high degree of tolerance to drought. The genotypes (lines) will be provided by EAP. The source of the material will be from the EAP experimental plots as well as lines commonly used by the area farmers.

EAP. In early February, two field experiments will be planted. The first one will deal with effect on yield of drought at different growth stages (pre-flowering, flowering, pod set and pod filling stages). Two control treatments are included: a) plots irrigated during the complete growing period, and b) plots that are stressed,

starting 20 days after planting. Resistant, moderate and susceptible genotypes will be used.

The other experiment will deal with row spacing in relation to drought. This experiment is needed in order to determine how to manage drought nurseries in the field. Normally, we use 60 cm between rows. Because of poor growth due to drought, evaporation plays a major role in water loss from the soil. Using narrower row spacing, we should have a better ground cover and more plants per unit land. However, there may be a trade-off because transpiration will increase in narrow spacing.

Prepared by



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