FCPRAC PROJECT PREPROPOSAL
FY 1999-2000 Grant Program

Category of grant: Plant Improvement _____Entomology _____Plant Pathology_____
_X__Management/Physiology _____Other (Specify) _____

Preproposal title: Decision Information System for Florida Citrus: Phase II

FCPRAC Project # _____Agency No. _____

Principal investigator(s): Name(s) and affiliation(s)

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Funding Requested: $35,000 for this year; $70,000 for total project

Duration of Proposed Project (Years): 2. Estimate breakdown of funds by budget category: Expense $5000; Salary $30,000 ; Equipment $0;

How this research will benefit the Florida citrus industry: Florida citrus growers will have the means to farm more precisely, comprehensively, and economically**.** The decision systems developed in this proposal will help growers reduce chemical costs, select rootstock varieties and make preplant decisions, relate tree growth and yields to their potentials, and monitor phenological events for useful applications to management practices throughout the season. Production options and criteria for selection will be easily followed in a menu form tailored to each cultivar type.

Project title: **Decision Information System for Florida Citrus: Phase II**

Principal Investigator(s): Howard W. Beck, James J. Ferguson, J. David Martsolf, Robert M. Peart, Fedro, S. Zazueta, L. Gene Albrigo, William S. Castle, Ronald P. Muraro, T. Adair, Wheaton

Research objectives for dealing with the problem:

1] Add appropriate climatic data acquisition and integration into all systems requiring temperature, rainfall or humidity data using FAWN and/or locally acquired data, through either automatic or manual input.

2] Expand the framework of the DISC Citrus Growth Events Module to improve the determination of timing and options between production practices to facilitate management decisions.

a) Develop an integrating model using winter temperatures and crop load to predict flowering intensity and the start of differentiation the coming year for major cultivar types. This will determine need for and proper timing of reproductive growth production options such as winter foliar urea.

b) Develop a temperature, crop load and cultivar model for the date of bloom. This will allow for adjustment of timing of production practices related to reproductive development. These components will constitute the beginning of a crop load management system that will be completed with the integration of postbloom options. Look at possible integration of a rust mite control expert system.

c) Add a windscar severity predictor based on postbloom wind speeds and direction and fruit development.

d) Develop record keeping functions for documenting within-year production practices needed for inputs to decision modules.

e) Develop and integrate a Citrus Cold Protection Module with appropriate production practices.

f) Integrate Agricultural Safety for Citrus into Production Practices components.

3] Expand tests of the Melanose and Greasy Spot Control Decision System, adding disease climatic requirement parameters, temperature effects on rate of fruit development and growth curves for other fruit than grapefruit.

4] Incorporate soil map access and other refinements to the Preplant Decision System.

5] Expand the Citrus Tree Size and Yield database, and develop a diagnostic system to be used to evaluate individual deviations from these baselines for comparing tree growth and yield. Build a statistical model of tree growth and yield to complement the Precision Ag project funded by the FCPRC.

6] Continue to integrate these various applications within a user-friendly DISC Operating System.

Research methodology and timetable: The means for incorporating and integrating climatic data on an automatic and manual basis are available and will be added. For the phenology related objective, an expert system that integrates methods and reasons for fruit set enhancement or reduction has being developed. Models for flowering intensity and bloom date will be added using existing data with validation during the next 2 years. Other modules such as wind scar prediction and cold protection will be added. For melanose and greasy spot, an integrator model of Cu deposition and dilution by fruit expansion, weathering and dislodgment was developed based on grapefruit. Adaptation to other cultivars and for all diseases for which control is Cu based is planned. For the preplant program, planned refinements include adding soil survey maps as a site reference, plus using soil horizon characteristics as selection criteria. Field data collection will continue for the tree growth and yield diagnostic module. A diagnostic procedure to evaluate less than average growth or production will be developed by a panel of experts and systematized. We have begun to develop the rules for the interaction between components and the integration of large quantities of data for use by all the modules. Further integration of grower practices with phenology timings and grower preferences for method of access will occur. This will involve grower interviews and grower plus extension personnel testing of modules as they become available.

Current and pending funding directed toward this research: J. W. Jones, R. M. Peart, and J. David Martsolf: Grant from USAID to the Univ. of Florida and the Lab for Agr. Meteorology, in Egypt. $100,000/year, split between the two institutions for 3 years. J. W. Jones. From Soybean Research Board, $800,000. Development of Soybean DSSystem. J. W. Jones, et al., From NOAA, $240,000. Effect of El Nino on Agriculture in the Sub-Tropics. H. W. Beck, PI. An Integrated Pest Management Information System Based On Object-Oriented Database Technology. USDA/CSREES, October 1, 1997 through September 30, 1998, $166,028. The four projects above are providing equipment, software, experience, and programming support which is helpful to overall DISC program.