Florida Citrus Advanced Technology Program

QUARTERLY & FINAL REPORTS: Control of Citrus Greening, Canker & Emerging Diseases of Citrus

Instructions Complete the fields based on your project specs. When finished, save the form to your local disk using a unique name. Then, go to **http://research.fcprac.com**, and log in with your user name and password using Researcher Login in the lower left. Find this project title and click on **Submit a Report**. Update your profile information if needed, then upload this report as directed.

2009-2010 REPORT	CATEGORY (drop-down)	TODAY'S DATE (m/d/yr)
○ *Quarterly Report* ◉ *Annual Report* ○ *Final*	Management	1/15/10

WHAT IS THE "HEADLINE" FOR THIS REPORT (e.g. a one-sentence "newspaper headline" describing what you accomplished)

HLB control trials sho no difference between treatments and HLB model under development to test controls.

TITLE and CONTACT INFORMATION

Proposal Title Epidemiology and disease control of huanglongbing

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Phone 772-462-5883	*Project Duration (years)* 3 *Year of Project* 1
Organization USDA, ARS	*Total Direct Funds (current year)*

REPORT UPDATE (650 words; provide details about your headline)

We have now developed a series of flexible stochastic models to predict the temporal increase and spatial spread of diseases. The models were initially characterized for citrus canker spreading in plantation and urban (backyard) environments. They have subsequently been extended to HLB in this project. The models can be used in a number of ways: to predict spread and to analyze the effectiveness of control strategies. Most attention has been given to spread within plantations, including allowance for proliferation of infection along boundaries in response to vector behavior. The models can readily be extended to consider spread at larger scales including spread through heterogeneous environments up to State-wide scales. We have also considered the effects of uncertainties in the distribution of host crops for example the effects of small areas of crop that may not be recorded but which can act as 'bridges' in transmitting disease. The effects of uncertainty in parameter estimates for dispersal parameters and transmission rates have also been included. Additional computer-friendly formulations of the models have also been developed to aid in education of stake-holders to illustrate the effects of uncertainty in predicting future disease spread and the effectiveness of alternative methods of control.

Estimation of parameters for dispersal of HLB poses considerable statistical challenges, especially where trees may become infectious before they are symptomatic/detected. Here we use an SEIDR model (Susceptible, Exposed (latently infected but not yet infectious), Infectious but not yet symptomatic/detected, Detected and infectious and Removed trees). Using MCMC methods, and extensive data from Southern Gardens for successive snapshots of the occurrence of symptomatic/detected trees in known populations of susceptible trees, we are able to estimate model parameters for the transmission rates and dispersal kernel for the disease. Current work is focused on the differential effects of host age on epidemiological parameters as well as variability across the plantation. From these it is possible to allow for uncertainty in the parameters as well as variability over time and through space. The uncertainty is then incorporated in models to predict spread and to allow for uncertainty in the efficiency and comparison of control methods.