CITRUS ADVANCED TECHNOLOGY PROGRAM

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

SELECT PERIOD December 2013

(●) *Quarterly Report* ( ) *Final*

Proposal Title

MANAGING ROOT HEALTH BY EXPLOITING BENEFITS AND MITIGATING CHALLENGES AFFORDED BY NEMATODES

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
3/20/14	Citrus Research and Development Foundation	Epidemiology and Cultural Control

REPORT UPDATE (500 words-It is not necessary in this public report to disclose your institution's proprietary information or intellectual property.)

Entomopathogenic nematodes: Amending soils to increase biological control of insect pests

We repeated moisture trials (described in September report) two additional times using both oven dried vs autoclaved soil. We unexpectedly, but consistently, found Catenaria sp. but no other nematophagous fungus survived desiccation in oven dried soil. The series of experiments reported here and in September 2013 demonstrated that S. diaprepesi and H. zealandica survived poorly in saturated soil compared to well-drained soil, whereas only Steinernema sp. survived better in saturated than in well-drained soil. The soil moistures used in these trials did not consistently effect the survival of H. indica. These results from controlled experiments support a recent report (Soil Biology and Biochemistry, 2013, 66:163-174) that the spatial patterns of these four EPN species in Florida citrus orchards were best explained by soil variables related to soil moisture (clay and organic matter content, water holding capacity, depth to groundwater). Comparative proteomic analysis revealed differences in protein expression by S. diaprepesi and Steinernema sp. maintained in well-drained and saturated soil. Detected proteins will be identified by LC-MS-MS to understand mechanisms of habitat adaptation. We found additional evidence for the hypothesis that soil moisture affects EPN community composition by sampling EPNs in 100 field plots from an experiment reported in 2013 (Biological Control 64:26-36). Briefly all four species of EPNs were added to native soil or to sandy soil used to fill tree planting holes in 2007 and again in 2010. The site is poorly drained with groundwater very near the surface and was originally inhabited only sparsely by H. indica. During the 4 year experiment, H. indica and the introduced S. diaprepesi dominated the EPN communities. However samples taken during this December reporting period (3 years after the original experiment terminated) revealed that H. indica and Steinernema sp. are both very abundant in native soil and in sand to the exclusion of S. diaprepesi and H. zealandica. The species specific effect of soil water potential on these Florida EPN natives appears to be the most robust physical variable studied to date for explaining, and potentially manipulating, naturally occurring EPN community structure.

Plant parasitic Nematodes: Characterizing a new nematode pest and the prevalence of resistance breaking populations of the citrus nematode.

Sampled soil and harvested fruit in 118, 4-tree plots at Ft. Pierce site. Between July and December, the numbers of X. vulgare more than doubled in untreated plots, compared with just a 15% increase in plots treated with oxamyl; however, the difference was not significant (P>0.05). Neither the oxamyl, nor the two experimental compounds reduced numbers of X. vulgare significantly compared to untreated controls. Treatments did not affect fruit yield per tree. However, the incidence of tree loss to citrus greening was especially high (20%) in untreated trees on one of the double-row beds where loss of trees treated with one of the experimental nematicides was just 4.0% (P=0.008). We characterized X. vulgare population densities in 20 sections of a heavily infested grove near St. Cloud and found no relationship between nematodes and either tree condition or root mass density. Soils are being analyzed to determine if there are physical or chemical properties related to the nematode population density or tree quality.

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Form PR-12 Quarterly Reports **SUBMIT REPORT**

CITRUS RESEARCH AND DEVELOPMENT FOUNDATION, INC.