

# Greening infection rate 1.6%

## Survey to estimate the rate of greening and canker infection in Florida citrus groves

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### BACKGROUND

In early summer of 2008, representatives from the Florida Department of Citrus, Florida Citrus Mutual and the University of Florida's Institute of Food and Agricultural Sciences (IFAS) met to discuss the potential economic impacts that greening could have on the Florida citrus industry. It was concluded that long-term projections of fruit production and prices, and an evaluation of the impact of potentially reduced fruit volumes on the citrus processing, fresh packing and input supply sectors, as well as on Florida's economy, were needed to assist the industry in making business, policy and research funding decisions.

It was also decided that this work should be based on reliable estimates of the degree of greening infection currently present in Florida citrus groves. IFAS agreed to lead the process of conducting a grower-based survey to obtain this information, working in collaboration with the USDA's National Agricultural Statistics Service (NASS), Florida Field Office (Florida Agricultural Statistics Service) and the Florida Department of Agriculture and Consumer Services' (FDACS) Division of Plant Industry (DPI).

### OBJECTIVE

The objective of the greening portion of this project was to develop reliable estimates of the extent of citrus greening infection, measured by number and/or proportion of symptomatic trees in Florida citrus groves. The project also involved determining the extent that growers were following management programs to slow its rate of spread, including scouting frequencies, trees removed due to greening, and number of pesticide applications to control psyllids.

The objective of the canker portion of the survey was to develop reliable estimates of the current incidence of canker and the number of trees removed due to canker.

### THE SURVEY

The survey was for the period Sept. 1, 2007 through Aug. 31, 2008.

Growers were asked to identify groves or blocks in groves by their location. Total number of trees and net tree acres by location and fruit variety (orange, grapefruit and specialty fruit) were requested. Citrus greening questions by location and variety included number and percent of trees symptomatic for greening, number of trees removed due to greening, number of scouting trips for greening, number of pesticide applications for psyllids and the date greening was first detected in the acreage represented in the survey.

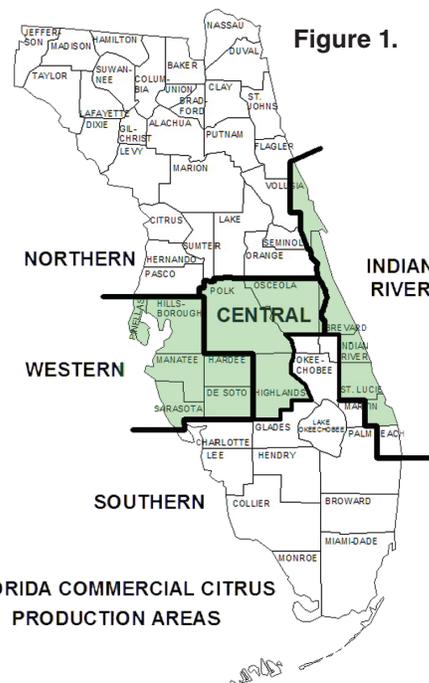
For the canker portion of the survey, information was also gathered for total number of trees and net tree acres by location and fruit variety. Questions included the percent of canker and number of symptomatic trees in the acreage represented by the survey, and the date canker was first discovered in this acreage.

The survey was mailed to growers in mid-December. Of the 3,037 survey forms mailed out, 949 (31 percent) were completed and returned. They represented 169,048 acres of citrus or 29 percent of total state citrus acreage, and 20,163,049 bearing and non-bearing trees, 27 percent of total state citrus trees.

NASS summarized the results by fruit variety (oranges, grapefruit, and specialty fruit), state total, production area (Indian River, Northern, Central, Southern and Western) and grower size category. Size categories were defined as: large – over 2,500 acres; medium – 250-2,500 acres; and small – less than 250 acres. Counties making up each of the production areas are: Indian River - St. Lucie, and parts of Brevard, Indian River, Martin and Palm Beach; Central – Highlands, Polk and most of Osceola; Western – Desoto, Hardee, Hillsborough, Manatee, Pinellas and Sarasota; Southern – Charlotte, Collier, Glades, Hendry, Lee, Okeechobee, and parts and Martin; Northern – Alachua, Citrus, Hernando, Lake, Orange, Pasco, Putnam, and Seminole (Figure 1).

### ROLES OF ORGANIZATIONS

DPI was responsible for mailing the survey form to more than 3,000 growers in its database. DPI and IFAS were



available to answer individual growers' questions about completing the survey. Follow-up telephone calls were made to a sample of non-respondents and some surveys were re-mailed. Telephone calls were also made to any respondents providing incomplete information or information requiring clarification and the resulting information was entered on the survey form. DPI received the completed forms, captured raw data from the forms electronically, and provided these data to NASS.

NASS tabulated, analyzed and summarized the raw greening data from the survey to provide a weighted percentage of trees greening-symptomatic, number and/or percent of trees removed due to greening, number of scouting trips used to detect greening and number of pesticide applications used for controlling psyllid populations. NASS also tabulated, analyzed and summarized the raw canker data to provide a weighted percentage of trees symptomatic for canker and number of trees removed for canker. Results were summarized by fruit variety – orange, grapefruit and specialty (tangerines and tangelos). Reported data were expanded to account for non-response or acreage not surveyed by comparing reported net acreage to known net acreage in the Florida Agricultural Statistics Service 2008 Commercial Citrus Inventory. Following non-response adjustment, data were averaged using net acreage to provide a weighted mean. Results were

provided at the state level by variety of citrus, for each of the five citrus producing regions – Indian River, Northern, Central, Western, Southern, and by grower-size category.

IFAS provided overall supervision of the project and, along with DPI, was available to answer individual growers' questions about completing the survey. All three organizations — IFAS, NASS and DPI — were instrumental in developing the questions for the survey and the instructions for completing the survey form.

IFAS will use the survey results to conduct and publish economic studies about greening and canker. These include long-run projections of orange and grapefruit production and prices as a result of impacts of the two diseases, and long-run structural implications of greening and canker for Florida's citrus processing and fresh packing sectors.

## RESULTS

### Reliability of Survey Results

Due to the relatively low response rate (31 percent), statistics are sufficiently reliable to be published only for oranges at the state level. Survey results for grapefruit and specialty fruit could not be published, nor could results for any fruit by production area or grower-size category. Attempts were made throughout the survey process to promote responses. A cover letter from Florida Citrus Mutual, endorsed by each of the regional citrus organizations stressing the importance of the survey, was sent out with the survey, and growers were given from mid-December until mid-April to complete their responses.

### Greening in Orange Groves

Statewide, growers removed 847,208 trees over the survey period

**Table 1. Citrus Greening & Canker Survey Results for Oranges**

State Total Acres	496,518
State Total Trees	65,775,300
Trees With Greening	1,025,024
#Trees removed	847,208
% Greening	1.6
HLB Scouting Trips	2
Psyllid Pesticide Applications	2
% Canker	15
<i>State total acres and trees taken from: USDA, Florida Agricultural Statistics. Commercial Citrus Inventory 2008. Orlando, Florida, April 2009</i>	

due to greening (Table 1). There were 1,025,024 trees visibly symptomatic for greening, resulting in a greening infection rate of 1.6 percent in these groves, which ranged from individual groves with no infection (primarily in the Northern area), to groves with 100 percent infection (primarily in the Indian River and Southern areas). Statewide, among growers who scouted for greening, the average was two times over the survey period. The most frequently reported number of scouting trips for growers with greening was four. However, growers that had no greening either scouted once or did not scout at all over the survey period. Based on comments received from some growers with high rates of infection, they had stopped scouting, which lowered the average number of scouting trips. Growers applied pesticides to control psyllids an average of four times annually.

Regression analysis was used to estimate the relationship between levels of greening infection and number of scouting trips, and levels of greening infection and number of psyllid pesticide applications. The correlation

between number of scouting trips and greening was low, 9.7 percent. The correlation between number of pesticide applications and greening was also low, 19.4 percent. These low correlations are not surprising. It is likely that growers with moderate to heavy greening are spraying and scouting the most, while those with high rates of infection and those with no infection were doing no scouting or spraying. This could account for the low correlations.

### Canker in Orange Groves

The amount of canker infection for the state was 15 percent. Canker infection rates were highest in the Indian River area and lowest in the Northern area.

## CONCLUSIONS

Since being discovered near Homestead in September of 2005, greening has spread into all commercial citrus producing counties in Florida. The overall infection rate in orange groves is now estimated to be 1.6 percent. But in some areas, such as Indian River and the south, infection rates are much higher and likely spreading rapidly. Repeating the survey in subsequent years should provide data to enable researchers to estimate the rate at which both greening and canker are spreading. It is also hoped that by next year's survey, the importance of this information will be more fully understood and grower response rates will improve.

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