FOR MORE INFORMATION: www.ars.usda.gov/Combating-Citrus-Greening-Disease/

COMBATING CITRUS GREENING DISEASE

ARS combats citrus greening disease through disease detection, prevention, and mitigation research. Citrus greening represents the greatest threat to the $3.35 billion U.S. citrus industry. It is caused by a bacterial pathogen, *Candidatus* Liberibacter asiaticus (CLas), which is spread by the Asian citrus psyllid. Since the psyllid's discovery in Florida in 1998, the industry has lost 60 percent of acreage and closed about 80 percent of juice plants and packinghouses. The disease has spread to Texas, California, Georgia, Arizona, and Louisiana. The following ARS advancements in FY 2020 highlight ongoing citrus greening response efforts.

New approach to solving crop pest and pathogen problems. ARS researchers in Fort Pierce, Florida, and an industry partner developed a method of attaching cells to plants; the cells deliver protective molecules in a targeted manner so that the harvested fruit or nut is not genetically engineered. Scientists have completed a proof-of-concept to protect tomato from whitefly-mediated diseases and are now evaluating this method for curing trees infected with citrus greening. This strategy holds promise for rapidly protecting plants in an environmentally sustainable method acceptable to consumers.

Enhanced detection of bacteria associated with citrus greening. ARS scientists in Beltsville, Maryland, developed a novel set of assays based on antibodies that recognize the citrus greening pathogen when it is pressed on a paper-like surface. The sensitive assay produces colored spots and is easily scaled to large numbers of samples. This simple method matches the current urgent need for accurate, sensitive, and high-throughput screening of citrus greening and holds promise for plant inspection and quarantine programs.

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Molecular profiling of citrus leaves. ARS scientists in Ithaca, New York, and Riverside, California, documented that lemon and navel orange trees infected with the citrus greening bacterium exhibited certain molecular changes. Molecular profiles began changing months before visual symptoms of disease appeared, demonstrating the utility of molecular profiling for early detection of citrus greening disease. Results from this study reveal differences in the response to infection between these two distinct varieties of citrus and can be used to improve diagnostic tests for citrus greening disease.

A strategy to control Asian citrus psyllid. Growers rely on insecticides to control Asian citrus psyllid, but insecticide-resistant psyllid populations are evolving and control costs are high. As an alternative to insecticide control, ARS researchers in Fort Pierce, Florida, are developing a "Conservation Biological Control" strategy that involves growing certain plants to support populations of insect predators that attack the psyllid. The researchers are using statistical modeling to optimize proportions of crown-of-thorn, lima beans, wild poinsettia, flowering buckwheat, partridge pea, and ornamental portulaca to aid in biological control of the psyllid.