FOR MORE INFORMATION: https://ars.usda.gov/Protecting Pollinators and Crops from Pests

PROTECTING POLLINATORS AND CROPS FROM PESTS

ARS promotes sustainable crop production by protecting crops and pollinators from pests that threaten their health and consequently reduce crop yields. More than 4,500 invasive pests damage crops, costing U.S. agriculture an estimated $30 billion annually. In addition, the risks posed to bees by invasive mites, beetles, and disease is equivalent to $15 billion in lost pollination services for fruit, nut (almond), and legume crops. The following FY 2019 accomplishments highlight several ARS advances in pollinator health and pest management research.

Mite blood-feeding dogma overturned: Varroa mite feeds instead on bee fat body. Varroa mite is the greatest factor in honey bee mortality. ARS researchers in Beltsville, Maryland, along with University of Maryland cooperators, discovered that varroa mites feed on honey bees' fat bodies, overturning decades of previous literature suggesting that varroa mites feed on honey bee blood (hemolymph). This has important implications for developing mite control strategies.

Small hive beetle genome sequenced. The small hive beetle is a worldwide parasite of social bee colonies. ARS scientists in Beltsville, Maryland, sequenced and characterized the beetle genome and characterized the proteins the beetles use to identify each other and honey bee colonies by smell. The study provides new insights into the genomic basis for local adaption and invasiveness in the beetle and a blueprint for control strategies that target this pest without harming their honey bee hosts.

Protecting sorghum from sugarcane aphid. Sugarcane aphid is a new invasive pest of sorghum, costing $742.7 million in production losses in 2015 alone. ARS scientists in Stillwater, Oklahoma, developed sugarcane aphid infestation monitoring methods based on multispectral imagery obtained from an aerial platform. This innovative system can delineate spatially variable infestations and differentiate between aphid damage and other crop stress events such as drought. These data can reduce the number of improperly timed or unnecessary insecticide applications. ARS scientists in Stillwater also released two sorghum breeding lines: 'STARS 1801S', which has genetic resistance to both sugarcane aphid and greenbug, and 'STARS 1802S', which has resistance to sugarcane aphid and head smut disease. These new resistant sources are already available to the sorghum community to safeguard their crops from this pest.

ARS facilitates registration of chemical pesticides for specialty crops. The Interregional Research Project Number 4 (IR-4 Project) facilitates registrations of conventional pesticides and biopesticides for specialty crops in the United States. In collaboration with the national IR-4 Project and cooperating universities and industries, ARS researchers in eight locations conducted 55 field trials for food crops, 96 field trials for ornamentals, and pesticide residue analysis on 40 sample sets of food crops. In 2018, ARS data supported the registration of four fungicides and one herbicide now available to specialty crop growers.

New precision sprayer for specialty crops. ARS scientists in Wooster, Ohio, developed an innovative sprayer to help specialty crop growers apply precise amounts of agrochemicals. Smart Guided Systems LLC in Indianapolis, Indiana, in April 2019 licensed and then commercialized the technology for use on citrus, apple, pear, pecan, and hazelnut crops. The Intelligent Spray Control system reduces spray application by up to 90 percent, depending on the crop type and age of tree. The World Ag Expo listed the system in its 2020 Top 10 New Products.