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PROTECTING POLLINATOR HEALTH

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 2020 accomplishments highlight several ARS advances in pollinator health and pest management research.

Spirulina as a promising nutritional supplement for honeybees. Beekeepers commonly feed honeybees artificial substitute diets to support colony health during periods of reduced forage, but these diets may be deficient in essential macronutrients. ARS researchers in Baton Rouge, Louisiana, found that the microalga spirulina is rich in many of the same macronutrients commonly found in pollen and that bees fed spirulina had similar markers of nutritional status compared to bees fed a natural pollen diet. Spirulina therefore shows promise as a pollen substitute or prebiotic diet additive to improve honeybee health.

Access to U.S. Conservation Reserve Program (CRP) lands greatly improves honey bee colony health. The honey bee nutritional landscape is critical to the sustainability of commercial beekeeping and modern agriculture, but these landscapes are diminishing rapidly. ARS researchers in Tucson, Arizona, found that colonies with access to CRP landscapes showed markedly improved size, performance, and function (including disease resistance) compared to intensively cultivated landscapes. The study validates the overwhelming utility of U.S. conservation lands in protecting pollinator health.

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Centipedegrass lawns support numerous bee species. Centipedegrass is a warm season turfgrass often grown in the southeastern United States. To understand the role of centipedegrass in supporting pollinators, ARS researchers in Tifton, Georgia, and scientists from the University of Georgia surveyed bees in centipedegrass lawns in central and southern Georgia. The study documented numerous bee species residing and foraging in and around these lawns. Landscape managers should therefore be conservative in applying insecticides to centipedegrass lawns, since some insecticides are toxic to bees.

Impact of climate change on alpine bee communities. To understand the impact of climate change on alpine bees, ARS scientists in Logan, Utah, conducted a 9-year study of bees in the Colorado Rocky Mountains. Periodic events in the bee life cycle (phenology) were less sensitive to climatic variation than flower phenology, potentially reducing seasonal synchronizations between flowers and pollinators. Interestingly, alpine bee diversity and population size increased in locations with large-scale bark beetle outbreaks, where dead trees promote greater diversity and number of flowers in the open canopy.