The black bump on the back of this honey bee is a varroa mite, which sucks vital fluids and can transmit viruses and pathogens to the bee. USDA-ARS photo.

LAND-GRANT UNIVERSITY RESEARCH & EXTENSION ARE TEAMING UP TO PROTECT IMPORTANT POLLINATORS.

Bees provide essential pollination for many of the nut, berry, fruit, vegetable, and seed crops grown in the U.S. To supplement wild bee pollination, farmers often rent managed honey bee colonies. Demand is skyrocketing, but catastrophic die-offs are threatening the supply of healthy honey bee colonies.

Parasitic mites, pathogens, pesticide chemicals, nutritional deficits, and environmental conditions have contributed to the decline of honey bees. Since 2006, a new disorder called Colony Collapse Disorder has destroyed one-third of all U.S. honey bee colonies every winter. Lack of viable honey bee breeding programs has made these losses even more profound, and piecemeal research has made it hard to manage challenges on a broad scale.

To coordinate wide-scale research and find sustainable solutions, land-grant university researchers and Extension specialists and educators across the U.S. have teamed up.

To combat mites, researchers are testing miticides and identifying genes related to mite resistance. Scientists are also monitoring pathogens in honey bee colonies, studying honey bee immune systems, and identifying genes related to disease resistance. Across the U.S., researchers are observing how different levels and combinations of chemicals from miticides and fungicides affect bee health and behavior. Other studies are looking at how nutrition affects bees' responses to mites, diseases, and chemicals. Scientists are also finding new ways to propogate honey bee colonies and enhance pollination from native and wild bees.

Extension specialists and educators are sharing information with beekeepers, farmers, home gardeners, regulatory agencies, and others. Beekeepers following research-based recommendations have saved an estimated 10,500 honey bee colonies, which provide a value of over $5,750,000 each year they are used to pollinate crops.

NEW WAYS TO PROTECT HONEY BEES.

REDUCING LOSSES TO PARASITES & DISEASES

- New guidebooks help beekeepers select mite control methods that reduce colony losses and keeps pests and the diseases they carry from spreading.
- Research and Extension programs helped Tennessee beekeepers reduce colony losses to mites by 15%.
- Research has illuminated bee responses to pathogens, making it easier to design control strategies that protect bee colonies.

LIMITING EXPOSURE TO TOXIC CHEMICALS

- Research and Extension efforts are limiting bee exposure to chemicals that impair bee health and behavior. New guidelines for almond growers reduce immature honey bee exposure to pesticides. Midwestern corn growers are using new practices to minimize exposure to chemically-treated seeds, and more Maine blueberry growers are using fungicides only when needed. Research is helping avoid the harmful effects that can occur when bees are exposed to multiple miticides or miticides and fungicides.
- Government agencies are using new information to set pesticide registrations and regulations.
- A new model enables reliable predictions of pesticide exposure and colony loss, shedding light on where interventions are most needed.

IMPROVING NUTRITION FOR BEES

- New nutrition recommendations for commercial honey bees could reduce colony losses by 15%.
- New blood tests measure the nutritional quality of the landscape around a bee colony and predict survival.

ENHANCING HONEY BEE POLLINATION

- Oregon researchers found that releasing honey bee brood pheromone in fields can entice bees to forage in hard to pollinate crops. Enhanced pollination could increase yields of these crops by up to 18%.

TRAINING BEEKEEPERS

- Outreach efforts have increased the number of beekeepers in many states and encouraged dozens of beekeepers to offer pollination services to farmers.
- The Florida Master Beekeeper program has provided nearly 1,000 public service activities, reaching almost 3 million people. North Carolina's Master Beekeep program has provided thousands of volunteer hours worth an estimated $5.6 million.
- Beekeepers who attended Florida's Bee College plan to use the knowledge they gained in their operations. Beemaster Programs in Connecticut and Tennessee improved participating beekeepers' knowledge 33.6%.

BREEDING HONEY BEES

- Multistate genetic research has led to honey bee breeding stocks that are resistant to parasites and diseases. For example, Purdue University bred honey bees with increased tendency to bite and remove mites from their bodies, which could eliminate the need for miticides.
- Researchers perfected techniques for long-term storage of honey bee semen, ensuring they can reproduce valuable species and commercial stocks in the future without having to breed live bees.
- Many states are using artificially inseminated queen honey bees with strong mite resistance to propogate healthy hives.

INCREASING USE OF NATIVE BEES

- Researchers identified native bee species that are important pollinators and identified the plants these bees use for forage. This information will help restore habitats that support native bees. More native bees means farmers would rely less on managed honey bee colonies for crop pollination.
- After research showed they can rely on native bee and feral honey bee pollination, some New York and Connecticut pumpkin and squash growers are saving money by not using managed honey bee colonies.

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