Scientists examine how common pesticide mixes may affect bee die-offs

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(PhysOrg.com) -- Since reports of widespread bee die-offs began to surface in October 2006, researchers have investigated possible reasons ranging from hive-infecting mites to cell phone-tower radiation. They have yet to pinpoint the cause of colony collapse disorder -- most likely, because there isn't just one, say University of Florida researchers.

The mysterious die-offs are likely a result of an accumulation of factors, which might include chemicals found in and around the hives, they say.

Led by UF Institute of Food and Agricultural Sciences bee specialist Jamie Ellis, the researchers have finished a first round of testing on bee larvae exposed to the pesticides most commonly found in bee hives. The work gives crucial insight to how the larvae react to these pesticides, which are usually only tested on adult bees.

More importantly, the work sets the stage for the researchers to test how the bees react to combinations of these pesticides.

Just like mixing the wrong medications can have deadly and unpredictable results in humans, chemical mixes pose a quandary for the bee industry. Bees are commonly exposed to multiple pesticides that are either applied to or nearby their hives.

"Beeswax, honey and pollen can contain low mixtures of fungicides, insecticides, and herbicides. The larvae develop in the presence of and consume these mixtures," Ellis said. "Any one of these pesticides may

not be that harmful to the developing larvae. However, it is possible that combinations of the pesticides can interact."

The U.S. bee industry is responsible for pollinating $15 billion worth of crops each year. By some estimates, bee pollination is responsible for as much as a third of the food we eat.

The work, funded by the North American Pollinator Protection Campaign, would be among the first to look at such combinations of chemicals introduced at the larval stage. At an Oct. 22 meeting of NAPPC, Ellis presented the initial results, which examined the individual effects of two herbicides, two fungicides and five insecticides commonly found in bee hives.

To study these pesticides, the researchers transferred individual larvae to special containers where they were given a typical diet containing a dose of the pesticide.

Some of the pesticides yielded surprising results. For example, the bees seemed to show an erratic response to two pesticides commonly used to get rid of hive-infecting Varroa mites. This could mean that some bees have become resistant to the pesticide while others have not, said Mike Scharf, a UF entomologist and co-primary investigator on the project.

"There's a really complex and unpredictable interaction of chemicals and genetics at play," Scharf said.

Even more so, he said, when the bees are exposed at the larval stage. Pesticide exposure at this developmental stage could have significant effects on the adult bees.

Later research will reintroduce these adult bees into the hive to see how the pesticide-exposed bees react to common stressors such as Varroa

mites and bacterial infections.

“It is going to be a lot of work to run through all these scenarios, but at the end of the day, it’s the only way to really find out how all these factors come together,” Ellis said. “It’s worth the work. Bees are a fundamental part of our ecosystem and our food chain.”

Provided by University of Florida (news : web)