

## **GE crops, pesticides expose bees to multiple threats**

By Roni Dengler

The usual suspects were off the hook.

Boulder County Commissioners determined in March that they would stop allowing farmers to grow genetically engineered crops on the county's agricultural land. But, their assessment wasn't driven by the typical arguments, the chance that genetically engineered crops might contaminate conventional ones or the question of whether consuming foods made from them poses risk to human health.

Instead the plight of bees and other pollinators motivated their decision.

Genetically engineered (GE) crops can reduce some of the risk inherent to the farming business, but the pesticides they partner with are impacting pollinator health.

"Pesticide use is rampant, overused and used prophylactically," said beekeeper Beth Conrey, president of the Colorado Beekeeper's Association.

"We have complicated the lay of the land with herbicides and [genetically engineered] seeds," said Conrey, who is vibrant, opinionated and a self-described bug nerd. "If you're spraying for something and some other guy is spraying for something else, that bug is navigating through that landscape exposed to all of it."

For Boulder County's commissioners, the reliance of GE crops on pesticides goes against their goal of becoming a national leader in sustainable agriculture.

"Rather than an integrated pest management approach, where chemicals are used as a last resort and only when needed, [GE crops] that are relying on synthetic pesticides really guarantee [their] continued use," said Commissioner Elise Jones.

"That to me is counter to where we want to be going," she added.

Commissioners Cindy Domenico and Deb Gardner had similar concerns, particularly over the effect the class of insecticides known as neonicotinoids, or "neonics," has on pollinators, especially bees.

Neonics are chemical insecticides that act on an insect's central nervous system in a way similar to nicotine, but more potently. With no way to break down the chemical, the pesticide over stimulates the insect leading to paralysis and death.

Though these chemicals were originally considered non-toxic to bees and other pollinators by scientists who work for the agricultural biotech companies that make pesticide resistant crops, investigation by independent and academic scholars indicate that even low levels of the drugs detrimentally affect honeybees and bumblebees, the pollinators the U.S. food system currently depends on.

In one study, scientists from the University of Illinois Urbana-Champaign showed that a certain neonic chemical compromises the honeybee immune system and makes the bees more susceptible to viruses.

Many research studies conclude that neonics also affect foraging behavior and memory in honeybees, exposing them to vulnerabilities that lead to their losses.

“Can we treat [GE] corn in a different manner than using neonics?” asked Commissioner Domenico.

That’s an important question considering honeybees are essential to the American food industry, pollinating plants that provide a third of the U.S. food supply and generating economic value exceeding \$17 billion.

Honeybee declines were first noticed in 2006. Though beekeepers expect to lose about 15 percent of their colonies each year from weather or sickness, losses have increased in the last decade. Survey data from beekeepers, hive inspectors and the U.S. Department of Agriculture estimate that in 2015 nearly half of colonies were lost.

Conrey cites three factors as culprits — pesticides, loss of habitat and infestation of bees by a gut mite. Though she gives each equal weight in contributing to bee losses, pesticides rise above the others.

Sadly, neonics aren’t the only pesticide ravaging pollinator livelihood.

“Insecticides (like neonics) kill insects,” said Conrey. “But then you have herbicides. Herbicides kill herbaceous, woody plants. Why should that matter? That’s bug’s food!”

In Boulder County, farmers have been growing genetically engineered corn and sugar beets on the county’s agricultural land since 2011. These crops are resistant to the herbicide glyphosate, often referred to by its brand name, Roundup.

Though the GE crops are protected from the herbicide by their genetically engineered trait, other plants in the vicinity are not; that’s the point of an

herbicide, to kill the weeds that are stealing nutrients and sunlight from the crop. But what about when the herbicide creeps beyond the farm field's borders?

"Everybody was concerned about what genetically engineered traits would do to the pollen. But, what is actually happening now is that [farmers] spray the heck out of their crops and there is no roadside left, no weedy patches. It's taking all the forage that the bee's need to keep going," said Virginia Scott, an entomologist who specializes in bee diversity and identification at the University of Colorado Boulder.

"People are so concerned about what's going on in that field that they're not thinking about what's going on outside of it," agreed Adrian Carper, a post-doctoral research associate at the University of Colorado Boulder.

Flyover application, where crop duster airplanes release pesticides over fields, is not allowed in Boulder County, but broadcast spraying, where a row of nozzles spray pesticides from a large tank mounted on the back of tractors, ATVs or trucks, is.

"We approve a chemical in a vacuum," said Conrey. "But that's not how they're put out on the fields. You throw all of this [pesticide] into a giant tank and roll it all out simultaneously."

Additionally, honeybees roam when foraging for food and can easily cover 10 miles while flying through many cropping systems, which can have grim consequences.

"Honeybees are moving all over the place, getting a cocktail of toxins, which at some point in time, becomes too much for their system to handle," said Carper.

Pesticides thus deliver a two for one punch against bees themselves and their habitat. GE crops' reliance on pesticides motivated Boulder County's commissioners to vote in favor of the pollinators over local farmers. The policy decision changes the landscape, and future, for Boulder County farmers, but perhaps other policy changes that involve the conservation of bee habitat need to go along with it.

"Basically, we are a spray-happy society," said Conrey. "We need to think about that a little bit more."