

The Buzzing Dead?

Researchers Say Zombie Flies Inflicting Severe Damage On Bees

BY RITA BRHEL
P&D Correspondent

Halloween may be history for this year, but real-life zombies are haunting at least four states, including South Dakota.

There has been a lot of discussion in the past few years as to what is causing the decline in both wild and domestic honey bees in the United States, threatening fruit, vegetable, and nut crops that depend on the insect for pollination as well as the beekeepers that rely on them for their livelihood. Both known reasons, such as winter kill, and undefined sources, including Colony Collapse Disorder (CCD), have been explored. A group of public and private entomologists in California, which form the ZomBee Watch effort, have identified another possible contributor of the epidemic of honey bee disappearances: *Apocephalus borealis*, a parasite to the honey bee more commonly known as the Zombie Fly.

The tiny, brownish-red Zombie Fly — smaller than a fruit fly — lays its eggs in the abdomen of a honey bee, and once the eggs hatch, the fly larva attack the bee's brain. The parasitized bee displays the iconic zombie-like behavior — leaving their hives at night, aimlessly flying to a light source with seemingly no control of their bodies, and remaining stranded from the hive where they die.

"Bee-killing flies are considered to be rare," said Brian Brown, a world-renowned researcher of the Zombie Fly, member of ZomBee Watch, and head entomology curator of the Natural History Museum in Los Angeles, Calif. "One aspect of bee-killing fly biology is of intense interest to many people — some species of these flies attack and kill domestic honey bees. Some researchers have found high bee mortality from these flies, but because they do not destroy colonies, their effects might not be noticed."

The Zombie Fly is not new to the United States. It's a species of native phorid fly that primarily parasitizes bumble bees and paper wasps. In fact, it wasn't until this year that researchers even knew that the Zombie Fly attacked honey bees. Now, a honey bee hive in Brookings is among 30 hives, most found in California but also in Washington and Oregon, where the Zombie Fly has been infecting honey bees, too. Besides South Dakota, it appears that the honey bee-preferred distribution of Zombie Fly is limited to California. Therefore, the honey bees in Oregon and Washington that have been infected may have been exposed as their hives were



PHOTO: METRO GRAPHICS

moved between pollinating crops along the West Coast.

The Zombie Fly kills the honey bee not only by isolating it from its hive but also because its larva feed on the bee's body. As many as 15 larvae can grow inside a single bee's body. After two to four weeks, during which the larvae pupate into an adult fly, the young Zombie Fly breeds and the female seeks out a new honey bee to infect. In California, parasitism begins in early June and peaks in the fall and early winter months. In South Dakota, the Zombie Fly is active from late May to September.

Phorid flies, of which the Zombie Fly is one of 3,000 known species—Brown estimates are that phorid species actually number up to 50,000—have a number of biological functions. Not all phorids are parasitic like the *Pseudacteon obtusus*, which parasitizes fire ants; some are herbivores and can be economically damaging to crops such as *Megaselia halterata* is with mushrooms; predators; or scavengers like the *Megaselia scalaris*, which feeds on decaying matter, including dead honey bees. But it is the Zombie Fly that is of interest, Brown said.

However, it is still unclear how big of a threat the Zombie Fly is to the honey bee population.

"CCD probably is caused by multiple factors including pathogens, parasites, and pes-

ticides," according to the ZomBee Watch website, www.zombeewatch.org. "Honey bees parasitized by *Apocephalus borealis* abandon their hive, a behavior associated with CCD. One of our goals is to determine how big a role, if any, the fly plays in hive losses in various parts of North America. Being infected with the fly is clearly not a good thing for honey bees, but at this point, we don't know how large an effect the fly has on hive health."

The ZomBee Watch team invites both beekeepers and interested members of the public to join the team, learning how to identify and collect potential zombes and document any Zombie Fly activity. The Zombie Fly is found across the United States. The purpose of the ZomBee Watch effort is to determine how widespread the bee-parasitism behavior is, said Ramesh Sagili, an entomologist specializing in honey bees with the Oregon State University in Corvallis, Ore.

Researchers have their doubts that the Zombie Fly could cause as large of an impact as CCD, although they do support continued studies into the idea, if only to rule out the Zombie Fly as a contributor.

"It's a stretch to say the fly is correlated to Colony Collapse Disorder," Sagili said. "At this point, I don't think it's a threat. I don't think it's at the level where it can depopulate hives in large numbers."

Opinion

The Problem With Pesticides? They Are Everywhere!

BY RITA BRHEL
P&D Correspondent

There are lots of good things about pesticides—namely in that they kill pests that would otherwise decimate our agricultural fields. But, as they are pesticides, they can be dangerous if someone is exposed to them above acceptable levels. That's why farmers should be wearing personal protective equipment and take special courses in how to properly apply the chemicals as well as what to do in case there is an accident that causes injury.

But the main problem with pesticides is that, no matter how safe a farmer is to prevent injury to themselves or application drift onto neighboring property, it's nearly impossible to control just how widespread the chemical becomes. And pesticides have been linked by science to various causes of illness, including cancer.

Take this information from the U.S. Department of Agriculture's Pesticide Data Program: 9 percent of all green bean samples of baby food had clearly unacceptable levels of one insecticide. One-quarter of pear baby food samples contained six or more pesticide residues, and nearly 4 percent of the pear samples contained 10 residues. Eeks! Now, to you, 9 percent or even 25 percent may seem to be pretty good odds, but this is talking about our babies' first foods. Zero percent is the only acceptable level for my babies. How about yours?

Ten percent of all fruit and vegetable samples had residues of another insecticide that has been implicated in honey bee declines. Bees aside, this particular insecticide—nicotynyls—because the plant absorbs the insecticide, including into the harvestable portion. Delicious.

In terms of drinking water, 85 percent of samples had residues of the herbicide 2,4-D, which is quite known already for causing reproductive problems in humans, as well as birth defects and cancer. More than 95 percent of drinking water samples contained the herbicide atrazine, which is linked to breast cancer specifi-

cally. The Pesticide Data Program reveals that people living in heavily farmed regions, which would include South Dakota and Nebraska, are regularly ingesting three or four herbicides in their water. Now, that's scary.

There's a lot of hype that organic foods are healthier than conventionally raised foods. And while the jury is still out about the nutritional advantage of organic foods—there is some scientific evidence, but also a lot of unanswered questions—the Pesticide Data Program's results related to organic pest control measures showed that organic residues are less likely and, if present, as much as 100 times lower.

Many consumers of organic, when confronted with the case that conventional foods are just as nutritious, will cite that they are seeking lower pesticide exposures. And it appears like it, although one thing that would need to be sorted out is whether the prevalence of organic has any effect on the residue-detection amounts, as clearly, organic production is less widespread than conventional production. At least, for now, the reasons for eating organic are largely anecdotal, at least until more thorough research is conducted.

The fact is, there is some very real evidence that pesticide exposure can cause very real health issues. That's not really a conventional-organic debate.

So, how do we reduce our pesticide exposure? Eating organic is probably the easiest attempt. Making your own baby food is another easy way, although a bit less convenient than opening a baby food jar. But avoiding drinking water? Still working on that one.

It appears that pesticide exposure is one of those facts of life living where we do. But especially to people already suffering from troubling health conditions, such as autoimmune disorders that largely has an environmental influence, that's not good enough. That, supported by data showing pesticide residues in food and water, can make a convincing argument that organic is safer. Rather, what it should do is make an argument that leads to safer pesticides or other pest control measures that work for conventional agriculture.



Rita BRHEL

S.D. Pastures Now Insurable With Rainfall Index

BROOKINGS — Pasture, rangeland and forage (PRF) insurance is available for 2013 in South Dakota based on a Rainfall Index (RI). Haying and grazing needs can be covered against moisture shortages using PRF-RI, says Matthew Diersen, SDSU Extension Risk Business Management Specialist.

"While producers would prefer to be paid if they did not have forage, PRF-RI relies on a close historical relationship between rainfall timing and forage production amounts," Diersen said.

He explains that producers can guard against low precipitation during insured intervals for localized grids specific to haying or grazing needs. Rainfall is grid-level and not farm- or ranch-level when measured.

Nov. 15, 2012, is the deadline to purchase or change coverage for the 2013 calendar year.

Diersen explains that the PRF-RI coverage available in South Dakota mirrors pasture rents (per acre) for grazing.

"The coverage is constant at \$204.23 per acre for haying. In the event that precipitation is low during an insured interval, producers could use indemnity payments to replace income or to purchase replacement feed," he said. "Unfortunately the coverage does not increase should prices move higher during the insured year."

Encouraging indicators at the state level suggest that PRF-RI would work well to manage forage production risk. In years with below-average rainfall in South Dakota the hay yield was also often below-average. In particular, notable drought years in South Dakota (1976, 1988, 2002 and 2006) had sharply lower rainfall totals and hay yields.

According to the Census of Agriculture there were 23 million acres in permanent pasture and rangeland across South Dakota in 2007. PRF has been available in South Dakota since the 2007 crop year using a vegetation index, but only 540,000 acres were insured with PRF in 2012.

"As detailed in the crop insurance provisions, catastrophic coverage is not available for PRF. Thus, producers may also purchase Noninsured Disaster Assistance Program (NAP) coverage for the pasture, rangeland, and non-alfalfa hayland," Diersen said.

He says it is up to producers to decide whether the insurance is necessary and valuable. "The high subsidy rate likely gives the

coverage value, but there are no absolute guarantees that precipitation shortages will always line up with forage needs," he said.

Premiums for PRF-RI vary by county, type, coverage level, practice/interval, and grid location. Producers have to pick a coverage level from 70 to 90 percent of the grid base. A default to consider would be the 70 percent level as it has the highest subsidy rate. Producers also have to pick a productivity level from 60 percent to 150 percent of the county base. This allows for intra-county variability in soil type, grade, and forage type.

Diersen explains that there are many ways to allocate coverage.

"Not all acres need to be in-

cluded. Selected acres are allocated across 11 two-month intervals. Intervals cannot overlap a given month. At most 70 percent and no fewer than 10 percent of acres can be in a single interval," he said. "Ideally, a producer will know key months that a lack of precipitation would result in less forage production."

For more information, visit www.igrow.org. Interested insurable parties can also contact a crop insurance agent or go online to the RMA website www.rma.usda.gov.

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