



Chemically Speaking

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Pesticide-makers Point to Other Culprits in Bee Die-offs

In a Nordic-inspired building tucked in a corner of the Bayer CropScience North American headquarters, high school students wander through 6,000 square feet dedicated entirely to the specialness of bees. Children taste different types of honey and examine the differences between honeybee and carpenter bee specimens.

The pesticide maker highlights its work to foster the insects around the world, welcoming school-age children at the site built apart from plant research labs and executive offices. Amid the displays are bottles of Bayer pesticides, something that struck Cara Garrison, a student at Raleigh's St. Thomas More Academy, as odd. "I thought it was a little weird to see some of that among all the bee-related things," Garrison said. "I was like, is that supposed to be there?"

That display in that building captures Bayer's multi-billion-dollar balancing act. Some of those pesticides contain tobacco-derived chemicals called neonicotinoids that many researchers say play a role in declining bee populations. Bayer spent \$12 million last year, when it earned profits of more than \$3.6 billion, promoting bee health as the world's top neonic maker and No. 2 Syngenta fend off suggestions the chemicals are bee-killers. Both companies are fighting pressure from regulators in the U.S. and Europe with publicity campaigns and lobbying aimed at telling people that neonics are beneficial and safe when used correctly, and that bees face greater peril from parasites, pathogens and poor diets as wild flowering plants diminish.

Bee die-offs could disrupt the human food chain, with a third of the foods consumed by Americans and Europeans dependent on pollinators like them. Researchers suspect neonic pesticides play some role in reported die-offs and the mysterious Colony Collapse Disorder. But they don't know how much. A comparison of more than three dozen pesticides found neonics produced by Bayer CropScience and Syngenta among the chemicals most toxic to bees, according to a September study by USDA researchers.

Bayer, Syngenta and Monsanto - which coats its seeds with neonics - are encouraging nonprofits, landowners and governments to plant more flowers and other plants bees need to feed. Their representatives are speaking at beekeepers' conferences and visiting agricultural research universities. Besides inviting visitors to bee centers on its corporate campuses outside Raleigh, North Carolina, and Monheim, Germany, Bayer offers teachers a downloadable digital science lesson about bees. A company Twitter feed promotes the benefits of neonics and studies that refute their link to bee deaths, often using the hashtag #FeedABee.

A global agro-chemical trade magazine recently honored Bayer's pro-bees campaign for what judges said was its effort "to broaden understanding and shift conversation from blaming solely pesticides towards a multiplicity of factors."

Critics say that is all little more than propaganda akin to the cigarette industry's efforts to confound people by highlighting inconclusive science. "I call it a red herring. You claim that ours isn't the only problem, so therefore it isn't a problem," said Massachusetts beekeeper Dick Callahan, a retired executive with a doctorate in entomology who co-authored a Harvard study on the effects of neonics on honeybees. The companies blame a parasitic mite as the biggest bee-

killer. Callahan said while the mite may be the greatest adversary of his honeybees, it doesn't explain why mite-free bumble bees are also disappearing.

Neonics were a breakthrough because they can be used to coat seeds rather than sprayed over plants. As the plant sprouts, the chemical is incorporated into every part of it - from roots, to stalk, to the flowers that attract bees and butterflies. Without neonics, growers could face extensive crop losses since old pesticides have been phased out because of the hazards they posed to humans and wildlife, said Dominic Reisig, an insect researcher at North Carolina State University who advises farmers. "I think the final verdict is still out there" on how large a role neonics play in bee deaths, Reisig said. "I would say clearly there's something there, but is it one percent? Ten percent? Ninety percent? We don't know."

Bayer produces three of the world's top five neonic pesticides in a worldwide market estimated to be worth about \$3 billion, with Bayer's two top-selling products taking about half the market, said Sanjiv Rana, editor-in-chief of Agrow, a trade publication for the agricultural chemicals industry. Syngenta's best-selling neonic is worth about \$1 billion in annual sales, Rana said.

Becky Langer, the Bayer CropScience manager for U.S. bee health, denied the company's 4-year-old campaign is related to the company's neonic sales. It grew out of decades of research on the interaction of chemicals and the crucial pollinators, she said. "One didn't pop up because of the other," said Langer, whose center oversees bee field research locations in North Carolina, California and Ontario, Canada. She said: "Bee numbers are actually not declining." But that depends how you count. On the one hand, figures from the U.N. Food and Agriculture Organization and the U.S. Department of Agriculture show there are more bee colonies now than 30 years ago.

But those numbers can be deceiving since beekeepers routinely separate a healthy hive into two, a practice that helps overcome accepted annual losses of about 18 percent. Beekeeper Steve Hildebrand, who keeps about 20 hives outside Raleigh, annually divides healthy colonies to replace dead ones. "It's harder to keep bees than it used to be," he said. "It seems to get harder every year." Losses in the U.S. the past five years have been especially acute, with reported annual losses of 30 percent to 45 percent, according to a study authored by researchers including the University of Maryland's Dennis vanEngelsdorp. The heavy death toll continues through the spring and summer, when bee populations are collecting pollen and should be their healthiest, the study said.

Across Europe and nearby countries like Algeria, beekeepers reported 17 percent of colonies lost last winter, twice that of the previous year. That has regulators and retailers zeroing in on neonics. The U.S. Environmental Protection Agency is working on new risk assessments, and the European Union is reviewing a 2-year-old ban on the biggest-selling neonics from crops during their flowering stage. "We're going to push with every ounce of our energy to get this thing reversed," former Syngenta Chief Executive Officer Michael Mack told stock analysts in February.

Meanwhile, Bayer and Syngenta are working on new bee-saving products. Syngenta is testing biological and chemical agents to fight mites and parasites. Bayer is working on repellants to

keep bees away from pollinating plants until pesticides lose their killing power, remote sensors for monitoring hive health, and the latest in a 30-year series of mite-killing treatments.

Work to develop a new miticide is worthwhile even though the parasites will likely develop a resistance before long, Bayer CropScience North America CEO Jim Blome said. “It's very difficult to get your investment back that way. In fact, you won't,” Blome said. “We believe in expanding bee populations.” (Yahoo! News, 11/23/15)

Study Finds Glyphosate and Acetamiprid to Have Relatively Low Toxicity for Honey Bees

Researchers from the U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS) and Mississippi State University tested 42 commonly used pesticides in a realistic field setting in order to determine their toxicity levels. The results were published in the [*Journal of Economic Entomology*](#). The researchers found that 26 pesticides, including many (but not all) neonicotinoids, organophosphates, and pyrethroids killed nearly all of the bees that came into contact with the test pesticide sprays. However, seven pesticides, including glyphosate and acetamiprid, killed practically no bees in the tests. Glyphosate is the active ingredient in the herbicide commonly known as Roundup and acetamiprid is a neonicotinoid.

A number of surprises also appeared in the study. First, an insecticide called sulfoxaflor was found to be near the middle in terms of toxicity. This is important because the EPA's approval of sulfoxaflor was recently overturned by the U.S. Ninth Circuit Court of Appeals. In fact, it was found to be less toxic to bees than permethrin, a pyrethroid insecticide that is used in agriculture, household pesticide products, flea shampoos for pets, and in head lice products for people. Also, four pesticides (methoxyfenozide+spinetoram, carbaryl, indoxacarb, and 1-cyhalothrin+chlorantraniliprole) that had been considered moderately toxic to bees were found to be higher risk when field-application concentrations were considered. Finally, one pesticide, gamma-cyhalothrin, which was considered to be a high-risk chemical, was found to be only an intermediate risk when used at the labeled rate.

Using a modified spray tower to simulate field spray conditions, the researchers mimicked a situation where an adult bee in a cotton field accidentally gets sprayed. This is an important distinction from previous studies that tested the active ingredients only, or that used artificial feeders with the pesticides in a sugar solution, none of which provide appropriate measures of the amounts of pesticide exposure in the field. Field spraying of insecticides and other pesticides may effectively kill insects, including valuable honey bees, and the risk to honey bees can be reduced by selecting pesticides with lower toxicity in field applications. This study determined that a number of pesticides, including a neonicotinoid, showed little to no toxicity to bees, meaning they could be effective alternatives to organophosphates, carbamates, and other neonicotinoids.

According to the authors, “Our data, particularly the ratios of field application rates to lethal concentrations of each pesticide, provide a quantifying scale to help extension specialists and

farmers with pesticide selection to maintain effective control of target pests and minimize the risk to foraging honey bees as well.”

The full article, “Spray Toxicity and Risk Potential of 42 Commonly Used Formulations of Row Crop Pesticides to Adult Honey Bees (Hymenoptera: Apidae),” is available at <http://dx.doi.org/10.1093/jee/tov269>. (Entomological Society of America, 10/13/15)

EPA Registers New Biochemical Miticide to Combat Varroa Mites in Beehives

EPA has registered a new biochemical miticide, Potassium Salts of Hops Beta Acids (K-HBAs), which is intended to provide another option for beekeepers to combat the devastating effects of the Varroa mite on honey bee colonies and to avoid the development of resistance toward other products. Rotating products to combat Varroa mites is an important tactic to prevent resistance development and to maintain the usefulness of individual pesticides.

The registrant, a company called Beta Tech Hop Products, derived K-HBAs from the cones of female hop plants, *Humulus lupulus*. To control mites on honey bees, the product is applied inside commercial beehives via plastic strips.

Varroa mites are parasites that feed on developing bees, leading to brood mortality and reduced lifespan of worker bees. They also transmit numerous honeybee viruses. The health of a colony can be critically damaged by an infestation of Varroa mites. Once infested, if left untreated, the colony will likely die.

This biochemical, like all biopesticides, is a naturally-occurring substance with minimal toxicity and a non-toxic mode of action against the target pest(s). There are numerous advantages to using biopesticides, including reduced toxicity to other organisms (not intended to be affected), effectiveness in small quantities, and reduced environmental impact.

More information on this registration can be found at www.regulations.gov in [Docket ID EPA-HQ-OPP-2014-0375](https://www.regulations.gov/document/EPA-HQ-OPP-2014-0375).

Find out about other EPA efforts to address pollinator loss: <http://www2.epa.gov/pollinator-protection>.

Learn more about biopesticides: <http://www.epa.gov/pesticides/biopesticides/>. (EPA Pesticide Program Updates, 9/30/15)

DuPont Crop Protection Survey Shows that U.S. Farmers are Using More Complex Weed Control Programs to Control Resistant Weeds

Herbicide-resistant weeds remain a top concern for corn and soybean growers. According to a survey conducted by DuPont Crop Protection at the 2015 Farm Progress Show in Decatur, Illinois, more farmers are scouting fields, keeping field records and adding multiple herbicide modes of action to spray tanks to combat herbicide resistance and control yield-robbing weeds. Though most of the growers surveyed said they are taking action against resistance, they're still concerned resistant weeds will cut yields and profits. Among the more than 1,200 survey respondents, 85 percent said they worry about controlling resistant weeds on their farms. Most said they rotate and/or tank-mix herbicides to address the problem.

Though awareness of resistant weeds was high and most industry experts recommend rotating herbicide modes of action (MOA) used on a crop in a given season, survey respondents were only moderately knowledgeable about the specific herbicide MOA being used on their fields. Less than half (48 percent) said they could name the herbicide MOA used on their farms, although another 26 percent said they had the information on file. Only 42 percent of growers said they tank-mix herbicides with multiple MOA.

Jeff Carpenter, corn and soybean herbicide portfolio manager, DuPont Crop Protection, said he's encouraged by increasing farmer awareness of the resistant weed problem. "Growers understand the implications increasing populations of resistant weeds can have on their operations and are becoming more proactive by applying a full range of tools to fight resistance."

While herbicide application is just one element of a comprehensive herbicide resistance management program, using herbicides strategically can play a significant role in avoiding resistance development, said Carpenter. "Starting with clean fields is a smart way to start the new growing season. Applying a burndown plus residual herbicide program eliminates emerging weeds and keeps new weeds from developing before planting. A solid herbicide program also minimizes the weed seed bank that can create problems for years, despite crop rotation and other cultural practices to control weed pressure."

The DuPont Crop Protection survey follows publication of results from an on-farm study by the University of Illinois and the USDA Agricultural Research Service, which showed that simply rotating herbicide MOA instead of mixing herbicides in the tank significantly increases frequency of herbicide resistance. Among the 105 farms in that study, farmers who used multiple herbicides per application in tank mixtures were less likely to have herbicide-resistant weed populations than those who simply rotated herbicides from season to season. When an average of 2.5 MOA per application were used, fields were 83 times less likely to have resistant weed populations, compared to growers using 1.5 MOA per application.

"As more growers use multiple herbicide modes of action, we hope to see further progress in fighting resistant weeds," said Carpenter. "To make it easier to achieve more complex tank mixes with less mixing and measuring, we have collaborated with growers to develop a number

of herbicides with two, three or more modes of action, each designed to address specific regional weed concerns. We are working together to help increase crop production to feed the growing world population.”

For effective herbicide resistance management, Carpenter recommends employing an integrated pest management strategy that includes these steps:

- Know what weeds are in fields and keep scouting records.
- Incorporate residual herbicides into the weed-control program.
- Use herbicides that contain more than one mode of action.
- Consider multiple herbicide applications in a season, starting with a strong preemergence herbicide program.
- Layer residual herbicide products across multiple applications, such as burndown, at planting, preemergence and postemergence. (DuPont Crop Protection, 11/6/15)

Cancellation Order Issued for Sulfoxaflor

On November 12, 2015, EPA issued a cancellation order for all previously registered Sulfoxaflor products. This cancellation order is in response to the September 10, 2015, order of the Ninth Circuit Court of Appeals finding that EPA improperly approved the Federal Insecticide, Fungicide, and Rodenticide Act registrations of the pesticide sulfoxaflor; the court’s order became effective on November 12.

Pursuant to EPA’s cancellation order, and beginning November 12, 2015, distribution or sale by the registrant of cancelled sulfoxaflor products is prohibited, unless such distribution or sale is for the purpose of disposal or export. Also, stocks of cancelled products held by persons other than the registrant may not be commercially distributed in the United States, but instead may be distributed only to facilitate return to the manufacturer or for proper disposal or lawful export. Use of existing stocks by end users is permitted provided such use is consistent in all respects with the previously-approved labeling for the product.

The Federal Food, Drug, and Cosmetic Act tolerances, also known as maximum pesticide residue levels for sulfoxaflor are not affected by either the court’s decision or EPA’s cancellation order, so crops that have been properly treated with sulfoxaflor or that may be treated with existing stocks as described in the final cancellation order can still be sold legally.

[View a copy of the cancellation order.](#) (EPA Pesticide Program Updates, 11/13/15)

Pesticide Registrations and Actions

- On September 25, the Florida Department of Agriculture and Consumer Services (FDACS) approved the special local need registration for the use of GOWAN MALATHION 8 Flowable, EPA Reg. No. 10163-21 for control of exotic (non-

established, quarantined) fruit fly members of the family Tephritidae in regulated areas under quarantine. The registration number, EPA SLN No. FL-150007 has been assigned. (FDACS letter, 9/25/15)

- On October 1, TOTALITY WOOD TREATMENT, (bifenthrin), was granted an experimental use permit (FMC Corporation, EPA Reg. No. 279-3281, FL15-EUP-03), for the protection of wood and other cellulosic materials against subterranean termites and other wood destroying insects in commercial, industrial, institutional, public and residential buildings. (FDACS PREC Agenda, 10/1/15)
- On September 23, FDACS approved the special local need registration for the use of MALATHION 8 AQUAMUL, EPA Reg. No. 34704-474 for control of exotic (non-established, quarantined) fruit fly members of the family Tephritidae in regulated areas under quarantine. The registration number, EPA SLN No. FL-150006 has been assigned. (FDACS letter, 9/23/15)

EPA Updates Standards to Increase Safety and Protect the Health of America's Farmworkers

On September 28, the U.S. Environmental Protection Agency (EPA) announced increased protection for the nation's two million agricultural workers and their families. The revised standards give farmworkers health protections under the law similar to those already afforded to workers in other industries. EPA's updates reflect extensive stakeholder involvement from federal and state partners and the agricultural community including farmworkers, farmers and industry.

Press release:

<http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceecac8525735900400c27/b18112371b9d3f8985257ece0057f07a!OpenDocument>

Blog post by Administrator McCarthy's and Department of Labor Secretary Thomas E. Perez:

<https://blog.epa.gov/blog/2015/09/protecting-the-people-who-help-feed-us/>

New site and resources including a factsheet, comparison chart and Q/A:

<http://www2.epa.gov/pesticide-worker-safety/revisions-worker-protection-standard>

EPA's videos:

- EPA's Revised Worker Protection Standard: <https://www.youtube.com/watch?v=p0PMYSirxIY>
- EPA's Revised Worker Protection Standard: Thoughts from a Former Farmworker: <https://www.youtube.com/watch?v=TAYGb1-LUH4>
- Amy Liebman, Migrant Clinicians Network, Supports EPA's Revised Worker Protection Standard: <https://www.youtube.com/watch?v=Ce4OH1qT-w8>

- Farmer Speaks in Favor of EPA's Revised Worker Protection Standard (in Spanish, with English subtitles) <https://www.youtube.com/watch?v=XJDkerbJmso>

En Español:

Web <http://espanol.epa.gov/seguridad-laboral-al-usar-pesticidas/estandar-para-la-proteccion-del-trabajador-agricola-revisado>

Comunicado de prensa

<http://yosemite.epa.gov/opa/admpress.nsf/7800f1e88403185d852573fb0064d0a6/b18112371b9d3f8985257ece0057f07a!OpenDocument>

Vídeos sobre el WPS:

- Estándar de EPA para la Protección del Trabajador Agrícola: <https://www.youtube.com/watch?v=bMTITUnCosk>
- Agricultor de Michigan habla a favor del Estándar de EPA para la Protección del Trabajador Agrícola: <https://www.youtube.com/watch?v=XJDkerbJmso> (EPA Pesticide Program Updates, 9/28/15)