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BEE DEATHS, PESTICIDES, AND A STALLED REGULATORY SYSTEM

BUSY AS A BEE: POLLINATORS PUT FOOD ON THE TABLE

Pollinators—including birds, bats, and bees—pollinate fruits, vegetables, and other crops that provide us with food, fiber, drugs, and fuel. In addition to pollinating food crops like apples, almonds, and pumpkins, bees pollinate forage crops including alfalfa and clover that provide feed for cattle and other animals.[1]

And, it isn't just honeybees that help put food on the table. North America's approximately 4,000 wild bee species help pollinate agricultural crops as well as the seeds, nuts, and fruits that are consumed by animals from songbirds to grizzly bears.[2]

Keeping bee populations safe is critical for keeping American tables set with high-quality produce and our agriculture sector running smoothly.[3] However, over the last decade bee populations have been in decline,[4] raising concern among scientists and policy experts across North America—including the National Academy of Sciences[5] and the White House.[6]

BEES ARE STRESSED OUT!

Both wild bees and honeybees are being pummeled by stressors that can act alone or together to pack a powerful and even deadly punch. Scientists have identified the following factors as the most likely contributors to bee decline:[7,8]

- Poisoning from an onslaught of toxic insecticides used on field crops and home gardens as well as pesticides used in bee hives to control bee pathogens;
- Loss of habitat from land use change and the widespread use of herbicides like atrazine, glyphosate (Roundup), and 2,4-D that kill off the blooming wild flowers and groundcover like clover that bees rely on for food;
- Diseases from rapidly spreading bee parasites like the deadly *Varroa destructor* mites, small hive beetles, and *Nosema* fungus;
- Climate change that can disrupt the timing between bees and bloom, so that when pollinators come out of hibernation, the flowers they need to start the season are not in bloom. Climate change may also shift the range of bees and plants, creating a mismatch between bees and their food.

Any one of the above factors may be enough to injure and kill bees, but various combinations are almost certain to cause serious harm or death. For example, disease can weaken a colony and make it more susceptible to pesticide poisoning, and vice-versa.[9] Either disease or pesticide poisoning can jeopardize a colony's ability to survive a particularly cold winter or an unexpected heat wave, when bees emerge but food is not available. This situation is compounded with a shrinking healthy habitat for bees.

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We know from our own experiences that combined stressors are more harmful than one stressor alone. Just think how much more likely you are to catch a cold when you haven't slept well for several days. That's what life is like now for the stressed out bee!

A PERFECT STORM: NEONICOTINOID PESTICIDES ARE SYSTEMIC, PERSISTENT AND TOXIC

The evidence increasingly points to neonicotinoid (neonics) pesticides as a significant—*and preventable*—contributor to bee population declines.[10] Neonics were first introduced in the mid-1990s and are now the fastest growing and most heavily used class of insecticides in the United States.[11] Neonics account for roughly 25 percent of the global agrochemical market and are the most widely used class of insecticides in the world today.[12]

These insecticides were designed to kill insects that harm crops, but like all insecticides, they also kill beneficial species like bees. The Task Force on Systemic Pesticides, an international committee of 29 scientists, reviewed more than 800 peer-reviewed papers published in the past five years, including industry-sponsored ones. Its assessment, entitled the Worldwide Integrated Assessment of the Impact of Systemic Pesticides on Biodiversity and Ecosystems (WIA), concluded that neonicotinoid pesticides are contaminating land, soil, and water. This poses toxic threats to earthworms, snails, butterflies, birds, and bees.[13]

Systemic within the plant

Neonics' systemic nature makes them effective at protecting plants from harmful insects. The plants absorb the chemicals with the intention of becoming inherently insecticidal—but with the unintended consequence of contaminating the pollen and nectar with neonics.[14,15,16] Bees and other beneficial insects that feed on the plant's nectar and pollen are harmed in the process.[17]

In addition to crops, neonic pesticides are also applied to seeds before they are planted, releasing neonic residue as dust into the air and soil during planting. This treatment infuses the growing plant with neonics, leading to contamination of the pollen and nectar in the adult plants. There is no systematic tracking of when, where, and how often pesticides are used for this purpose; seed treatments are not included in the U.S. Department of Agriculture (USDA) National Agriculture Statistics Service (NASS) database.[18] In at least some cases, seed treatments have little or no benefit to crops according to a U.S. Environmental Protection Agency's (EPA) study, wasting farmers' money.[19] Nonetheless, at about 95 million acres annually, corn accounts for almost one-quarter of all harvested land in the United States, and virtually all of that corn (92 to 95 percent) begins with a seed treated with neonics.[20] More than 90 percent of North American canola seeds planted are neonic-treated, as are approximately half of U.S. soybean seeds.[21] Other neonic-treated seeds include wheat, dry beans, potatoes, pumpkins, grass, and sunflowers.[22] Unfortunately, pesticide-treated seeds are often the only ones commercially available.

Prophylactic uses of pesticides such as seed-treatments are inconsistent with an Integrated Pest Management (IPM) framework, which favors the use of non-chemical treatments. Pesticides should *only* be used in cases where the pest population is high enough to pose an economic threat to farmers, and all other strategies have failed.[23]

Persistence in the environment

Like most pesticides, the neonicotinoids leach into surrounding soil, and rain or wind can carry them away from farm fields to streams, waterways and neighboring land.[24,25,26] Neonics accumulate and remain in soil for months to decades, depending on the soil type and weather conditions.[27] Because of both their persistence and water solubility, neonics can affect non-target plants and insects over long periods of time, wreaking havoc on biodiversity as fish, reptiles, birds, and mammals that rely on insects as a food source may also be adversely impacted.[28,29]

Because of their persistence in the environment, there is now disturbing evidence that neonics are making their way into our food supply. Limited testing by the U.S. Department of Agriculture (USDA) has found neonics in fruits and vegetables, where the pesticide's systemic nature prevents it from being washed off the surface of these foods.[30] While more research is needed, the presence of neonics in food and water raises concerns about their potential health effects on people.

Highly toxic to Bees

Bees' exposure to neonics can cause effects ranging from acutely lethal to chronic injury; some neonic pesticides are 5,000 to 10,000 times more acutely toxic to bees than the World War II insecticide DDT (dichlorodiphenyltrichloroethane) made famous in Rachel Carson's 1962 book *Silent Spring*, and now banned globally for agriculture uses.[31] Studies of chronic exposure to doses well below those that cause immediate death have

been shown to impair bee health in multiple ways. Laboratory studies of honeybees report a range of threats from neonics, including weakened immune systems, impaired foraging and homing abilities, and possible organ damage.[32,33,34,35,36] Laboratory studies of bumblebees report that exposure to neonic pesticides is associated with fewer queen bees, reduced reproduction, and impaired foraging and homing abilities.[37, 38, 39, 40, 41] These laboratory studies are consistent with a field study on wild bees that foraged in fields of crops grown from neonic-coated seeds. These bees had reduced nesting and failed to build brood cells for new larvae.[42] Bees harmed this way could be weaker and less likely to survive a disease outbreak, a harsh winter, or other stressors.[43,44]

THE REGULATORY LOOPHOLE THAT USHERED NEONICS ONTO THE MARKET

Pesticides must be approved by the EPA. Unfortunately, investigations by NRDC and later confirmed by the Government Accountability Office revealed a deeply flawed system.[45,46] We found a loophole—referred to as "conditional registration"—has allowed the majority of pesticides to enter the market without a public and transparent process. In some cases, pesticides have not even been subjected to a full set of toxicity tests. As many as 65 percent of more than 16,000 pesticides were first approved for the market through this loophole, including neonicotinoid pesticides.[47] In particular, a proper field study had not been conducted of the effects of the pesticides on bees. The EPA requested one from the manufacturer, Bayer CropSciences, but had yet to see it before approving the pesticide in 2003.[48]

In spring 2015, still without a proper bee field study, the EPA announced that it was unlikely to approve new outdoor uses of neonic pesticides until Bayer submitted additional new data on impacts on bees.[49] The EPA now requires the industry to submit data on a pesticide's potential impact on young bees, toxicity from eating contaminated pollen and nectar, and long-term impacts on whole colony health and survival. That is good news and a step in the right direction, but fails to address existing uses.

RECOMMENDATIONS AND SOLUTIONS

We know that there are a number of significant factors stressing and harming bees, including the loss of flower-rich and bee-friendly habitat, harmful pathogens and diseases, and harmful pesticide uses. An effective pollinator protection strategy would reduce or eliminate harmful pesticide use on farms and around homes, increase the abundance and diversity of blooming trees and flowers, prevent the spread of parasites and pathogens through quarantine controls on shipping managed bees, and developing monitoring and mapping programs to track wild and managed bee populations.[50]

HOW THE EPA AND USDA CAN TAKE ACTION:

- THE EPA SHOULD CANCEL THE USE OF NEONICS. An NRDC legal petition calls on the EPA to initiate cancellation proceedings for all neonicotinoid pesticide products, beginning with those with safer alternatives. Systemic and persistent pesticides like the neonics pose too great of a risk to non-target and beneficial wildlife.[5l] In the meantime, the EPA should speed up the review of neonics. The EPA's current leisurely timetable stretches to 2019.[52] Given the rapidly accumulating scientific evidence against neonics, that's far too slow.[53] Immediate intervention is needed.
- CLOSE THE CONDITIONAL REGISTRATION LOOPHOLE. Under current EPA rules, harmful pesticides can enter the market with a conditional registration, without thorough toxicity tests. This is how many neonics have been approved. The process has been abused and must be stopped.
- THE USDA SHOULD CANCEL PESTICIDE SEED TREATMENTS. The overuse of pesticides as seed treatments is creating a chronic hazard to bees, butterflies, and other wildlife. Seed treatments should be cancelled, particularly where they have little to no economic benefit for farmers.
- THE EPA AND USDA SHOULD TRACK THE PRODUCTION, SALE, USE, AND ENVIRONMENTAL MOVEMENT OF PESTICIDES. This should include data on bee deaths, waterway contamination, and industry sales and usage of neonics, including seed treatment.[54]

RECOMMENDATIONS FOR A SUSTAINABLE BEE-FRIENDLY FUTURE:

- INCREASE BEE-FRIENDLY FLOWER-RICH HABITAT. Farmlands, urban parks and gardens, public lands, and even roadside right-of-ways could all support pesticide-free wildflowers to provide forage for bees and other pollinators.
- SUPPORT GROWERS TO TRANSITION TO MORE SUSTAINABLE FARMING METHODS. Farmers need support to help them move toward integrated pest management, use of cover crops, and crop rotation practices.[55] University agriculture extension programs need educational and outreach resources to help farmers move away from harmful pesticides and toward IPM approaches.

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