Native Bees and Pesticides

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(photo credit: unknown)

Pesticides: Hard for bees to avoid

Many different insecticides, herbicides, and fungicides are commonly used in urban areas, public lands, agricultural landscapes and timberlands to kill insect pests, diseases, and weeds. However, many pesticides - including insecticides, fungicides, and herbicides - harm pollinators and other beneficial insects. Their effects include deterring navigation and memory; reducing the ability to forage; and reducing important flowering plants, which in turn impacts a bee's ability to feed and reproduce healthy offspring; Native bees have to travel and forage to eat and bring nutrients back to their nests for the brood. Neonics (see "Pollinators and Neonicotinoids" below) and many restricted use pesticides can even kill some bees on contact if exposure is high enough.

Exposure to pesticides can also compound the effects of other stressors on pollinator populations, such as loss of habitat and exposure to pathogens and diseases. Humans are creating pesticide-laced environments for our pollinator species and it's keeping them from thriving at levels needed to pollinate and sustain healthy natural vegetation in forests, meadows and prairies or to provide sufficient pollination for agricultural crops.

In fact, pesticide contamination is so widespread in the United States that we cannot produce legitimately organic honey since bees travel several miles to forage and they encounter pesticides and other pollutants in their search for pollen and nectar. There are simply few places left in the United States where bees can find several miles of quality floral resources and water without some level of pesticide exposure. In fact, more than 90% of pollen samples from North American bee hives in agricultural landscapes are believed to be contaminated with more than one pesticide (Mullin, CA et al. 2010)

A recent study looked closer into how the environment can counterbalance the impact of pesticides on native, solitary bees. Reducing the impacts of pesticides on bees depends on environmental diversity and flower availability. This means that a higher diversity of flowering plants is advantageous for bees, as well as ecological diversity, since it can provide a wider array of nutrition for bees and also decrease stress on bees. (Boff et al, 2020).

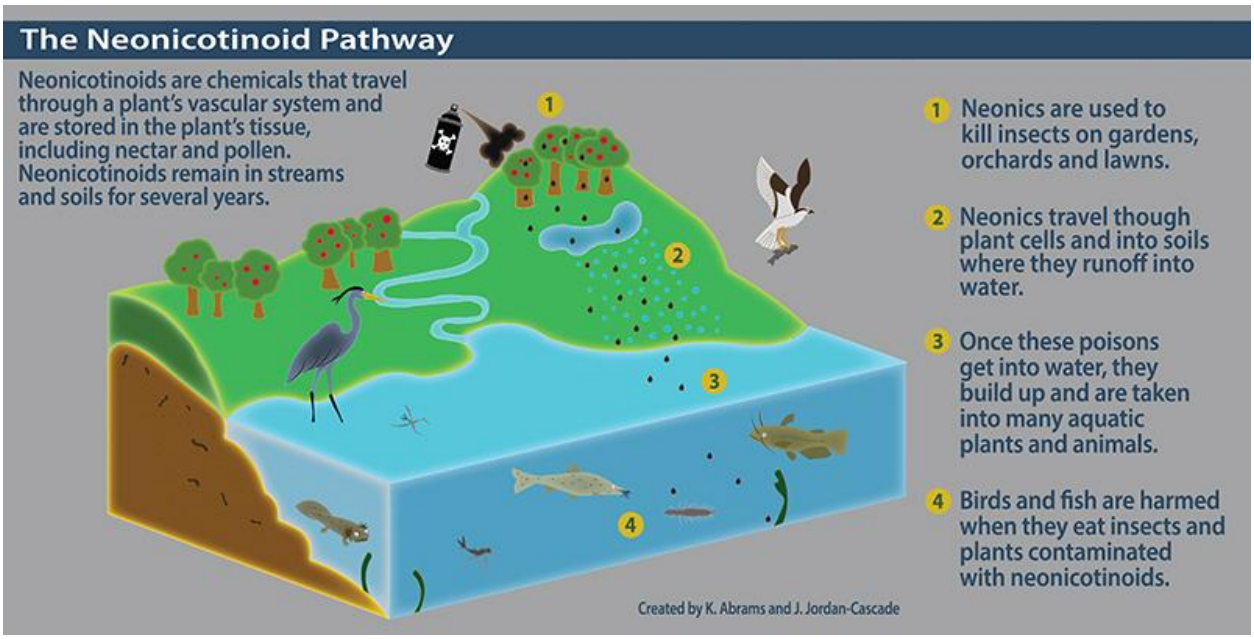
Neonicotinoids: A particular hazard for bees

Along with habitat destruction and degradation, neonicotinoid pesticides (also called neonics) are a contributing factor to the catastrophic loss of bees and other animals. Neonics are the most widely used class of insecticides globally, used on more than 140 crops. Neonics are systemic pesticides that are highly toxic to insects at very low doses. These pesticides are absorbed and taken up by the plant, ending up in the nectar and pollen collected by pollinators and the seeds, fruits, and leaves eaten by other animals (Sánchez-Bayo, 2014).

Neonics are specifically designed to be bio-persistent. Even when applied before a plant blooms, neonic absorption throughout plant tissue combined with its long lasting presence results in exposure and bee mortality long after the original pesticide application. When applied to the ground, neonics can continue to kill ground nesting bees, earthworms and other beneficial soil organisms long after they've been applied. Pesticide investigations in Oregon determined that neonic applications on trees killed foraging bees the following year.

Chronic exposure to low levels of neonics can also cause "delayed mortality," where the rate of mortality increases over time as a result of cumulative neurological toxicity. Neonics also result in sublethal effects including reproductive disorders, failing immune systems and increased susceptibility to parasites. Bumblebees appear to more sensitive to neonic exposure than honeybees, including failure to properly feed at the individual and colony level (The Task Force on Systemic Pesticides, 2017).

Many peer-reviewed studies conclude that pesticide application rates that regulatory agencies consider protective to the environment actually harm aquatic organisms found in surface waters (dragonflies, mayflies, snails and other animals that form the base of the food chain and a healthy, clean watershed) and build up in soils to levels that can kill soil organisms. This attack at the base of our food chain can throw off the delicate cycles of soil and water organism health. Without pesticide-free watersheds and thriving insect populations, we are likely to see ecosystem collapse.



A Closer Look at Pesticide Impacts on Pollinator Survival.

For more than fifty years our pollinators have encountered exposure to highly toxic pesticides like neonics, chlorpyrifos, and other new products for which we don't have long-term studies. Bees suffer severe learning and memory deficits after ingesting very small doses of chlorpyrifos pesticides, which directly threatens their success and survival. (Urlacher et al, 2016). Chlorpyrifos pesticides have been popular amongst farmers since 1965 when chlorpyrifos was first registered. Ultimately, bees need to be able to remember how to get back to their homes after foraging. If they have to travel much longer distances for food due to disappearing biodiversity, then their chances of being exposed to harmful pesticides are greatly increased and will ultimately contribute to further pollinator deaths.

Fungicides have insecticidal properties that can kill bees on contact or cause sublethal harm. Effects include changes in development, immune deficiencies and reproductive problems that can reduce the long-term survival of bee populations. Exposures to fungicides can, in some cases, synergistically interact with other pesticides to increase their toxicity to bees. One possible mechanism is that fungicides block the enzyme pathway bees use to detoxify other pesticides (Xerces Society, 2019).

Native Bees Need Our Help...Now!

The intensification of chemically dependent agricultural practices, the use of honey bee apiaries across the landscape, climate warming, drought and other weather shifts and widespread

pesticide use in urban areas all contribute to wild bee declines across the globe. We can help solve these problems by protecting pollinator habitats and ensuring that they are ecologically diverse and free from toxic chemical applications. To solve the problem of widespread pesticide use, we must adopt a transition to organic practices, curtail the widespread uses of toxic synthetic pesticides by implementing more adaptive practices and proactive land management policies, and begin thinking about pest management in a way that improves soil quality and increases plant diversity.

We need to act quickly to protect native bees and their habitat. The survival of our ecosystems depends on these keystone species, native pollinators.

References

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