



SPOTlight: Neonicotinoids are a commonly used and effective pesticide, but studies suggest that exposure can be harmful to bees.

What are neonicotinoids?

- Introduced in the early 1990s, neonicotinoids are the most widely used pesticide, becoming popular due to their effectiveness, easy application, and their low toxicity to vertebrates.^{1,2,3}
- Neonicotinoids are used on agricultural crops and in urban areas. Although usually applied as a coating on seeds, neonicotinoids can also be applied to the soil, or by spraying the plant directly.⁴
- Neonicotinoids that are applied to seeds are taken up by the plant and are present in all plant parts (leaves, roots, flowers, nectar, and pollen), making them highly toxic to insects.⁵

How are bees exposed to neonicotinoids?

- Bees can be exposed to airborne neonicotinoids or by consuming pollen and nectar from plants treated with neonicotinoids⁵

What are the impacts of neonicotinoids on bees?

- There is evidence that neonicotinoids have detrimental effects on bees, yet these effects greatly vary depending on levels of exposure.⁵
- Neonicotinoids target the central nervous system of insects and have been associated with altering bee learning and memory, reducing immunity and foraging efficiency, and increasing mortality.^{5,6,7}
- One study found that honey bees placed near corn crops treated with neonicotinoids had a 23% reduction in life span compared to bees that were not placed near neonicotinoid treated corn.⁶ Another study found that honey bees exposed to the neonicotinoid imidacloprid performed 28% fewer foraging trips and died 1.2 times faster than those that were not exposed.⁷
- Recent studies suggest neonicotinoids are addictive to bees with bees choosing to visit plants treated with neonicotinoids over non-treated plants.⁸

Why are bees important?

- Bee pollination produces \$15 billion in crops each year in the United States.⁹
- Approximately 1/3 of our food comes from animal-pollinated crops, a majority pollinated by the honey bee.¹⁰
- Both honey bees and wild bees have experienced major declines in recent years.¹¹ Since 1940, honey bee hives have declined by 60% in North America.¹² These declines are attributed to a variety of factors such as habitat loss, disease, climate change, and pesticides including neonicotinoids.¹¹
- Over the 2017/2018 winter, Illinois bee keepers lost 50% of honey bee colonies, some of the highest losses in the country.¹³
- Bees, especially wild bees, are important in maintaining biodiversity with 500 wild bee species in Illinois and 4,000 species in North America.

Are there alternatives to neonicotinoids?

- In 2018, France banned five neonicotinoids and the EU banned three.
- A study assessing neonicotinoids alternatives in France estimated that there was an effective alternative to 96% of the banned neonicotinoids. Alternatives included both chemical and physical pest control methods.¹⁴
- Although alternatives to neonicotinoids exist, it is uncertain how practical neonicotinoid alternatives are and how safe they are for the environment.¹³

References and additional resources

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