

Understanding Pesticides and the Impact to Bees

Invasive species are the second greatest threat to global biodiversity after habitat destruction. As such, British Columbia's land managers working to protect the province's natural biodiversity, are tasked with the management and control of invasive species. Without the use of pesticides, invasive plants and animals can have significant negative impacts to wildlife habitat and can change ecosystem processes by the alteration of wildfire frequency and intensity, hydrology or soil chemistry.

Pest Management

Integrated Pest Management (IPM) is a decision-making process for managing pests in an effective, economical and environmentally responsible way. This approach can be used for managing pests on crops, livestock, in natural areas and on private property. IPM can include preventative and cultural practices as well as the use of physical, biological and chemical controls. When the use of chemical controls is warranted and appropriate, pesticides are a commonly used management tool.

What Are "Pesticides"?

A pesticide is any substance or mixture of substances that is intended to prevent, destroy or repel any pest. Pests can



Alfalfa Leafcutting Bee *Megachile roduntata*; P. van Westendorp BC AGRI

be insects, mice or other animals, unwanted plants (weeds), fungi, bacteria or viruses.

The term "pesticide" is an umbrella term for various different types of chemicals, grouped into the type of pests they target. Herbicides, insecticides, fungicides and rodenticides are all different groups of pesticides that are specific to the type of pest that they control. Within each group, there are different types of products that have specific modes of action that work in different ways to control the pest. For example:

Herbicides:

- » kill plants by disrupting or altering one or more metabolic processes, specific to plants
- » have different modes of action, or ways that they kill plants, so not all herbicides will work on all plants



Quackgrass; G. Graham

Insecticides:

- » kill insects by disrupting their nervous system, damaging their exoskeletons, repelling them or controlling them by some other means
- » usually target one or more species of insect



True Armyworm;
Bugwood.org, R. Smith

Fungicides:

- » target fungi including rusts, blights, and sometimes mold and mildew
- » work in a variety of ways, but most of them damage fungal cell membranes, or interfere with energy production within fungal cells

It is important to understand that not all pesticides are alike – the various different types of pesticides have distinct chemical differences, different modes of action, and different effects on different organisms.

Effect of Pesticide Types on Bees

Most insecticides can hurt bees, butterflies, and other beneficial insects. There is scientific evidence that the mode of action of some types of pesticides, such as neonicotinoid insecticides, cause harm to bees, however this does not mean that all pesticides harm bees.

The most common type of pesticides used in invasive species management are herbicides. The mode of action of herbicides is specific to plant enzymes and cells that are not present in animals or insects, including bees.

Health Canada scientists determine the level of risk to bees from pesticide use by completing a thorough, science-based risk assessment. Based on this information, they decide how to manage the risk to best protect bees. Only after all of these steps are completed will the scientists approve how, when, where and if a pesticide can be used in Canada.

There are various current research efforts looking into toxicity, and indirect effects of herbicides on bee populations, however at present, there is insufficient evidence that herbicides are harmful to bee populations.

Best Practices

The labels of pesticides that pose risks to pollinators specify detailed directions for use to reduce potential exposure. Following these directions will help protect pollinators.



- » **Always read and follow the pesticide label instructions.**
- » Minimize the need for insecticides by properly identifying insects, tolerating pests below treatment thresholds, and trying alternative control methods before using chemical insecticides.
- » When choosing ornamental plants for gardens, consider using native plants, which often require less maintenance and pesticide use.
- » Consider using granular rather than liquid pesticides as granules are less likely to leave residue on plant surfaces.
- » Apply pesticides as close as possible to the target pest to minimize pesticide drift.
- » Help pollinators by dedicating small strips of land, along ditches, berms and the edge of fields for the planting of nectar and pollen-bearing plants that bloom throughout the summer season.
- » Include bee-friendly plants in residential and commercial landscapes.

References/Links

Food for Bees. <http://www.gov.bc.ca/foodforbees>

Health Canada's Pollinator Protection website. <https://www.canada.ca/en/health-canada/services/consumer-product-safety/pesticides-pest-management/growers-commercial-users/pollinator-protection.html>

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Update on the Neonicotinoid Pesticides. <https://www.canada.ca/content/dam/hc-sc/documents/services/consumer-product-safety/reports-publications/pesticides-pest-management/fact-sheets-other-resources/update-neonicotinoid-pesticides-january-2020/update-neonicotinoid-01-2020-eng.pdf>

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