



## 10 Facts About Neonicotinoids in Ontario

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by Susan Chan

### The Nature of Neonicotinoid Pesticides:

1. Neonicotinoids are a class of synthetic insecticides. Their active ingredients include clothianidin, imidacloprid, thiamethoxam, sulfoxaflor, thiacloprid, and acetamiprid, all of which are registered for use in Ontario. At least one more neonicotinoid, dinotefuran, is likely to be registered in Canada in the near future. They are sold under myriad brand names, with varying amounts of active ingredient and varying application methods. Some brands are a combination of active ingredients.
  2. Neonicotinoids are powerful neuro-toxins. They bind to nerve receptors (acetylcholine receptors) and block the proper functioning of the nervous system. They are all highly toxic to bees and aquatic invertebrates and vary in toxicity to fish, birds, small mammals and humans. This is clearly stated on their registration labels. Labels for neonicotinoids registered for use in Ontario are available at the federal [PMRA](#) label site. The site has a search function which will bring up the labels for all registered products by active ingredient (see the list of active ingredients in neonicotinoids above). At low dosages, the effects of neuro-toxins can be sub-lethal, meaning they do not kill an organism exposed to them but may cause a reduced ability to gather food, to navigate, to ward off disease, or to reproduce. Sub-lethal effects are harder to detect and may go un-noticed but they are no less serious as they can affect the ability of a population to survive. At present, evaluation of pesticides in Ontario and elsewhere is based on immediate toxic effects and does not consider these sub-lethal effects.
  3. Neonicotinoids are systemic, meaning they are applied to a part of the plant but migrate throughout the plant. For example, active ingredients applied to seeds will end up in pollen, nectar, leaves, roots, and even the guttation water that plants often release on the tips of their leaves. This is what makes neonicotinoids so effective from a pest-control perspective. However, they can be ingested by non-target organisms, including the pollinators and other beneficial insects who feed on the nectar and pollen of treated plants. They can be ingested by anything eating any part of the plant such as deer, birds, and humans who may consume food crops treated with neonicotinoids.
  4. Neonicotinoids are persistent. Unlike the naturally-occurring substance, nicotine, synthetic neonicotinoids do not break down quickly in natural systems. Again, this makes them effective from a pest control perspective. Because they persist and are highly water soluble, they easily end up in ground and surface water, and have the potential to remain in soil and aquatic environments. As a result, although actual application levels may be low on a farm in a single season, with repeated use those levels build and the amount of active ingredient in the environment increases. Over time, the accumulation of neonicotinoids may cause a delayed toxic effect on organisms living in the soil, natural areas, or watershed.
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5. Neonicotinoids can bio-accumulate in the individual organisms that ingest them. Individual organisms may ingest sub-lethal amounts of the active ingredients by eating any part of a crop or other plant on which neonicotinoids have been applied, by coming in contact with contaminated water, or by consuming other organisms already contaminated. Over time, the amount of neurotoxin in the individual increases and so does the likelihood of toxic impacts.

### **Neonicotinoid Use in Ontario:**

1. Neonicotinoids have been in use in Ontario since the early 1990s. Their use has escalated dramatically in the two decades in which they have been available. The patents on many neonicotinoid products are expiring. This means that generic copies of the original pesticides may soon flood the market, making identification more difficult for farmers if they do not pay attention to the names of active ingredients on labels.
2. Neonicotinoids are now registered for use on hundreds of crops in Ontario. These include not only “major” crops, such as corn, soybeans, wheat and canola, but also “minor” crops, ranging from orchard crops, field and greenhouse vegetable crops, and fruit crops to specialty crops such as ginseng, sweet potatoes, herbs and non-food crops such as ornamental plants, Christmas trees, and turfgrass. This does not mean that every farm is using them. Neonicotinoids are widely used on golf courses at rates that are much higher than those allowed in food crops.
3. Neonicotinoids may be applied in four ways: as foliar (leaf) sprays, as soil drenches, by injection into trees, and as seed treatments. All are systemic and cannot be washed off a product once they have migrated into the plant.
4. There are no up-to-date statistics on neonicotinoid use in Ontario by crop, region, or application method. The latest public pesticide census for Ontario was published by the Ontario Ministry of Agriculture in 2008 and does not include neonicotinoids applied as seed treatments. A new census is being planned for 2014. At the moment, only the sellers and/or manufacturers of these products can know how much has been sold for use recently in Ontario.
5. Many farmers may not be aware that the products they are using are neonicotinoids because they buy a product by its brand name rather than by its pesticide class designation. They are unlikely to be aware of the characteristics of neonicotinoids referred to in this factsheet. Seed treatments on corn have received wide publicity, but other uses have not. In those cases where neonicotinoid is applied via seed treatment, seed treatments are mostly applied off-farm, prior to purchase by the farmer, at facilities which may not even be in Ontario or Canada. Many Ontario farmers claim that they cannot presently source untreated seed for the varieties that they grow. Different farming systems could be financially impacted in different ways by an immediate blanket ban on all neonicotinoid use in Ontario.