



FREQUENTLY ASKED QUESTIONS (FAQ'S) ABOUT NEONICOTINOID PESTICIDES

1. *Q. How are you sure that the problem with bee decline is caused by neonicotinoid pesticides and not varroa mites, viruses, nutrition or loss of habitat?*

Bee health issues such as varroa and viruses, while significant, have been managed by beekeepers for many years, but despite their best efforts, beekeepers cannot manage neonicotinoid usage and exposure. As well, it's important to stress that neonicotinoids are not separate from the other problems facing honey bees – exposure to these pesticides actually makes them worse. By compromising the bees' immune systemⁱⁱⁱ, bees are more vulnerable to viruses and find it more difficult to fight off varroaⁱⁱⁱ; by reducing their navigation skills, neonicotinoids affect the bees' capacity to forage and communicate forage opportunities to other bees^{iv}; by reducing the availability of a diversity of uncontaminated plants, neonicotinoids compromise nutrition^v. Most recently, however, research from Harvard University^{vi} directly links neonicotinoid pesticides to Colony Collapse and winter losses. Bee health issues cannot be addressed in isolation from the impact of these pesticides, which is why we believe that suspending the use of these chemicals is central to any strategy to address the survival of honey bees.

2. *Q. Why do you say that honey bees have declined by 35% over the past three years when the number of colonies in Canada has actually gone up?*

We currently measure the decline of honey bees by counting the losses of colonies that occur over the winter. In Ontario, 2012/13 winter losses amounted to 37.9% of colonies compared to the pre-2007 (and pre-neonicotinoid) historical average of 15-18%^{vii}. Nation-wide, the winter mortality rate rose to about 29 per cent of honey bees^{viii}. The most recent information from an OBA survey for 2013/14 shows that forty percent of respondents lost more than half their hives this winter. However, the winter loss figure for Ontario is somewhat misleading, though, as it doesn't consider additional spring and summer losses that occur because colonies are weak from the sub-lethal effects of pesticides and cannot recover from winter damage.

- a. The fact that, despite these losses, the number of colonies has increased is primarily due to the efforts of beekeepers to maintain their inventory by dividing surviving colonies. However, the related costs of labour, new queens and the replacement of contaminated comb significantly erodes the ability of an Ontario beekeeper to make a living and deters new commercial beekeepers from entering the market. New hives,

as well, are less productive pollinators and honey producers. OBA estimates the value of replacement and opportunity cost to be \$500, far higher than the \$105 being offered by OMAF to those who lose more than 40% of their colonies in 2014. A relevant indicator of the well being of the industry is honey production, which has declined by 32.6% in Ontario between 2012 and 2013, twice the national average.^{ix}

3. Q. Neonicotinoid pesticides have been around since 2004 in Ontario, why is the problem just showing up now?

There are a number of reasons why this problem is emerging now:

- a. Increased acreage of corn crop^{xi} Although neonicotinoids are approved for use on many crops in Ontario, corn represents the most concentrated use. In 2004, the number of acres of grain corn in Ontario was 1.7 million acres. By 2012, this was up to 2.3 million acres, an increase of 34%, despite the fact that total cropland acreage has stayed the same over this period. As well, soybean crops, which use neonicotinoids significantly, have grown to 2.7 million acres: combined they represent more than 50% of Ontario field crops.
- b. Increased application of neonicotinoids. Although Canadian figures are not available, we know that North and South America represent 75% of the global market for treated seeds^{xii}, a market worth \$2.3 billion in 2012. In 2003, total pounds of neonicotinoid insecticides used in agriculture in the U.S. were less than 500,000 pounds.^{xiii} By 2009, the use amounted to 3.3 million pounds, a 560% increase, which has likely increased since then. With only a 34% growth in grain corn crop size, does this mean that crops could be using more than three times the amount of neonicotinoids per acre than was used in 2003? And the pesticide industry expects that this market will double in the next five years.^{xiv}
- c. Accumulation in soils and plants.

We know that neonicotinoid pesticides accumulate in the soil, increasing the intensification. The Environmental Protection Agency in the U.S. (EPA) reports that clothianidin, the neonicotinoid found in corn and canola, has a half-life of between 148 and 1,155 days depending on the soil type.^{xv} Even untreated plants may take up residues of neonicotinoids still present in the soil from previous applications. The EPA also reports that clothianidin “has potential to leach to ground water and be transported via runoff to surface water bodies.”

4. Q. Beekeepers in the Prairie Provinces are not reporting bee deaths related to neonicotinoids. Why are Ontario and Quebec the only provinces seemingly affected?

There are significant differences between agriculture in the Prairie Provinces and agriculture in Ontario that may account for the different experience with neonicotinoid pesticides. Whereas corn, at 2.3 million acres, and soybeans, at 2.7 million acres, comprise more than 50% of Ontario’s field crops, Alberta, for example, grows one-twentieth the amount corn^{xvi} in twice the area of crop land, with canola comprising 25% of its field crops^{xvii}. The relevance here is that corn uses two to four times the amount of neonicotinoid pesticide per acre than

canola^{xviii}. The intensive planting of crops that are heavy users of neonicotinoids in Ontario makes it difficult for commercial beekeepers to avoid exposure to these neurotoxins.

We are already seeing what might be the effects of this build up in some prairie provinces. Manitoba lost 46 per cent of its honey bee colonies in 2012/13, a record rate for the province.^{xix} (No results yet for 2013/14) We believe Prairie beekeepers can anticipate the same experience as Ontario's beekeepers if they continue to increase their corn crops^{xx} and, as well, experience the inevitable toxic accumulation of neonicotinoids from current canola crops.

5. Q. Is it accurate to say that the 2012 bee kills were an anomaly, a 'perfect storm' of early, dry windy weather?

Canada's Pest Management Regulatory Agency (PMRA) confirmed that in 2012, 70% of the affected dead bee samples tested positive for residues of neonicotinoid insecticides used to treat corn seeds^{xxi}. It was originally thought that the unusual early spring weather of 2012 were the cause of incidents of bee kills. These kills were linked to neonicotinoids associated with the large amount of dust created by planting treated corn in unusually dry conditions. Further, it was felt that better adherence to published Best Management Practices would prevent additional incidents.

However, the PMRA's most recent report on bee kills in 2013 revises that opinion: *"in spring 2013 with more typical weather patterns, we continued to receive a significant number of pollinator mortality reports from both corn and soybean growing regions of Ontario and Quebec, as well as Manitoba. Consequently, we have concluded that current agricultural practices related to the use of neonicotinoid treated corn and soybean seed are not sustainable."*^{xxii}

Due to the late spring, corn planting for 2014 has been delayed, so it is too early to tell whether 2014 will be Year Three of significant bee losses due to neonicotinoid poisoning.

6. Q. Won't the new Best Management Practices (BMPs) encouraged by PMRA protect bees?

The promotion of Best Management Practices (BMP) regarding the proper application of treated seeds has been put forward as a solution to the toxic exposure of bees to neonicotinoid pesticides. These suggested farming practices are aimed at reducing the dust associated with spreading neonicotinoids at planting and include adjustments and improvements to equipment and the use of new seed lubricants. In theory, BMPs are a good idea but are not the answer for protecting bees.

First, neonicotinoids are systemic, water-soluble pesticides applied to seeds. That means that they are drilled into the soil and taken up by the corn plant through the soil to kill insects feeding on the corn. While the dust generated from the planting coated seeds can cause direct mortality of bees, only 2% of the active ingredients are released through the dust;^{xxiii} the remainder is found in pollen and also in water and soil, which are known to accumulate over an extended time period^{xxiv} creating acute and sub-lethal exposure throughout the season

and for seasons to come. Not only are bees exposed to these neurotoxins from dust that settles on adjacent wildflowers, but the pesticide itself contaminates ponds and puddles in and around the fields that bees rely on for sources of water.^{xxv} Furthermore, the new seed lubricant from Bayer, which is touted to be the 'solution' to the dust problem has shown through their own research to reduce the dust by only 21%.

Second, despite the new guidelines, we continue to see the same, if not more, acute bee kills associated with the planting of neonicotinoid treated corn and soybeans. This would indicate that either the BMPs do not work or that compliance is an issue.

Integrated Pest Management (IPM), however, could be an effective strategy. Its goal is to utilize the least hazardous pest management options only when there is a demonstrated need and to take special precautions to reduce the danger to the environment.^{xxvi} Instead, neonicotinoid-treated seeds are applied prophylactically regardless of whether pests are present in a particular field or at levels that will lead to economic losses. In the opinion of Tracey Baute, Field Crop Entomologist from Ontario's Ministry of Agriculture and Food (OMAF):

"We have seen the use of neonicotinoid seed treatment evolve from being used on those acres that needed it for specific pest problems, to being used on nearly 100% of corn acres and 65% of soybean acres in Ontario. Based on my experience, only 10 to 20% of the corn and soybean acres are actually at risk of most of the soil pests on the product labels. I recognize the ease that insecticide seed treatments have provided, but they are insecticides and should be used for that purpose. Growers not fitting into the high risk factors may not need insecticide seed treatment, and should consider trying fungicide-only seed next year."^{xxvii}

7. Q. What will happen to grain growers if neonicotinoid pesticides are banned? Will they suffer significant economic impact?

A. Since virtually all corn seed planted in Ontario is now treated with neonicotinoids, whether they are needed or not, it is difficult to say exactly what the result of suspending the use of neonicotinoid pesticides would be. As stated above, only 10% to 20% of corn and soybean acreage is at risk of insect pests treated by neonicotinoids^{xxviii}. Research demonstrates that preventive neonicotinoid seed treatments do not consistently result in successful management of key pests or crop yield benefits, which suggests that widespread use of treated seed is not warranted. As well, some growers we have talked to indicate minimal increase in yield per acre related to pesticides, barely offsetting the additional expense of treated seed (which has nearly doubled since 2002^{xxix}). Some point to improvements in soil nutrients, irrigation techniques and increased plant population density as more likely reasons for yield improvements.^{xxx}

In Italy, where neonicotinoid pesticides were banned for corn (maize) in 2008, the monitoring network, APENET has found that farmers' untreated maize crops did not suffer reduced yield and that productivity remained high. They concluded that a similar reduction in disease incidence could be achieved by rotating crops and adopting resistant hybrids without using insecticides.^{xxxi} A similar US study also demonstrated only slight reductions in yields with

untreated seeds.^{xxxii} Using figures provided by a representative from DuPont who stated, “*We did a lot of yield testing of these products and in corn it would be five bushels less without these products*”,^{xxxiii} Ontario could anticipate, at the very worst, a 3.2% drop in production.^{xxxiv}

8. Q. Can we expect to see a quick and full recovery of bees and other pollinators if we ban neonicotinoid pesticides?

If neonicotinoid pesticides are removed from all use, we would likely eliminate the mass bee kills at spring sowing that we experienced in 2012 and 2013 (and possibly 2014). However, it's important to note that the lasting and cumulative impact of neonicotinoids make an immediate ‘bounce-back’ of colonies unlikely. Neonicotinoid pesticides can linger in soil and water for years and be taken up even by untreated plants that are sowed in contaminated soil. Bees could still experience sub-lethal effects from the pollen and contaminated water. The experience in Italy, though, provides good evidence that within three years the bee populations showed signs of complete recovery from the effects of neonicotinoids.

Perhaps a more compelling question is ‘what happens if we *don't* suspend the use of these chemicals?’ How long can the beekeepers manage these losses before the industry collapses? What is the tipping point where our food production is threatened by the disappearance of honey bees, wild bees, and other pollinators?

9. I'm told the science about neonicotinoid pesticides and bee health is inconclusive. Shouldn't we wait until science can prove that neonicotinoids are the problem?

Those who consistently call for more research tend to be those who would benefit from a delay and the continued use of neonicotinoid pesticides. In fact, there is currently a great deal of independent, peer reviewed science related to the effects of neonicotinoids on honey bees and other pollinators, aquatic insects and other wildlife, and the volume is growing. The OBA has seen more than 150 studies and has gathered some of the most recent and relevant research and resources on its website www.ontariobee.com/neonics. In addition, we have evidence through scientific test results from Health Canada's Pest Management Regulatory Agency (PMRA) confirming the link between neonicotinoid pesticides used in corn and soybeans and the mass bee kills in 2012 and 2013.^{xxxv}

But more to the point, shouldn't the burden of proof be on proving that neonicotinoid pesticides do *not* cause lethal and lasting harm? The European Union employed the United Nation's Precautionary Principle in their decision to suspend neonicotinoid pesticides for two years, “*When an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.*” If Canada employed the precautionary principle, many toxic substances, contaminants and unsafe practices would not be produced or used the first place. The precautionary principle concentrates on prevention rather than mitigation.

10. Q. Shouldn't the OBA be working with farm groups or the Ontario Bee Health Working Group to come up with a solution that is acceptable to farmers and beekeepers?

The OBA has always had positive relationships with Ontario's farmers and farm groups. Our bees pollinate Ontario fruit and vegetables and our members place their hives in farmers' fields. While many farmers understand and support our position some large agri-business groups like the Grain Farmers of Ontario believe *"if a decision on this important technology was to be made outside of the regulatory system, it would be unscientific and rash."*^{xxxvi}

Our responsibility is to protect our members and our bees. Our position is based on independent peer-reviewed science. While we support finding acceptable alternatives, any delay in suspending the use of neonicotinoids on field crops puts our bees and our members' livelihoods at risk. Once these pesticides are banned we can determine whether there are ways to use them safely or to find alternatives. For example, neonicotinoids could be suspended for prophylactic use, but could be used on a permit basis by those farmers with a proven need.

11. If these products are so toxic to bees, why did the PMRA register them in the first place?

In fact, neonicotinoid seed treatments were given only a temporary registration. PMRA is currently re-evaluating the uses of neonicotinoid insecticides. The regulatory body has stated their concern with current agricultural practices related to the use of neonicotinoid treated corn and soybean seed, saying that current practices are 'not sustainable'. Although the PMRA has recently reported that they have expedited the review to 2015 (from 2018), and have given it its "highest priority"^{xxxvii} the OBA is concerned that this will not be soon enough to save our bees.

ⁱ "Neonicotinoid clothianidin adversely affects insect immunity and promotes replication of a viral pathogen in honey bees" National Academy of Sciences of the US. Gennaro Di Presco, et al.

<http://www.pnas.org/content/early/2013/10/18/1314923110>

ⁱⁱ "Immune suppression by neonicotinoid insecticides at the root of global wildlife declines"

http://www.gmfrecymru.org/pivotal_papers/JEIT-D-12-00001_proofs.pdf

ⁱⁱⁱ "Crop pollination exposes honey bees to pesticides which alters their susceptibility to the gut pathogen nosema ceranae" <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0070182#authcontrib>

^{iv} "A common pesticide decreases foraging success and survival in honey bees."

http://zembla.vara.nl/fileadmin/uploads/VARA/be_users/documents/tv/pip/zembla/

2011/Moord_op_de_honingbij/Bees-Pesticides-Henry-03-30-12-Science.pdf

^v "Are Neonicotinoids Killing bees?" <http://www.xerces.org/neonicotinoids-and-bees/>

^{vi} Sub-Lethal exposure to neonicotinoids impaired honey bees winterization before proceeding to colony collapse disorder. Chensheng Lu, Kenneth M. Marchol, Richard A. Callahan. Bulletin of Insectology 2014 <http://www.bulletinofinsectology.org/pdfarticles/vol67-2014-125-130lu.pdf>

^{vii} CAPA Statement on Honey Bee Wintering Losses in Canada (2013)

<http://www.ontariobee.com/sites/ontariobee.com/files/2013%20CAPA%20Statement%20on%20Colony%20Losses%20-%20final.pdf>

^{viii} <http://www.cbc.ca/news/canada/huge-honey-bee-losses-across-canada-dash-hopes-of-upturn-1.1699198>

^{ix} Stats Canada. Table 001-0007 production and value of honey 2009-2013

<http://www.ontariobee.com/sites/ontariobee.com/files/honey%20statistics%202009-2012.xlsx>

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- ^{xiv} <http://www.marketsandmarkets.com/Market-Reports/seed-treatment-market-503.html>
- ^{xv} EPA (Environmental Protection Agency) 2010. Pesticide Fact Sheet: Clothianidin http://www.epa.gov/opp00001/chem_search/reg_actions/registration/fs_PC-044309_30-May-03.pdf
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- ^{xviii} EPA Pesticide Fact sheet: Clothianidin http://www.epa.gov/opp00001/chem_search/reg_actions/registration/fs_PC-044309_30-May-03.pdf
- ^{xix} CAPA Statement on Honey Bee Wintering Losses in Canada (2013) <http://www.ontariobee.com/sites/ontariobee.com/files/2013%20CAPA%20Statement%20on%20Colony%20Losses%20-%20final.pdf>
- ^{xx} <http://www.businessweek.com/articles/2012-11-08/canadas-corn-belt-attracts-the-hot-money>
- ^{xxi} Health Canada: Evaluation of Canadian /bee Mortalities that Coincided with Corn Planting in Spring 2012. <http://www.ontariobee.com/sites/ontariobee.com/files/Evaluation%20of%20Canadian%20Bee%20Mortalities.ENG-1.pdf>
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- ^{xxiii} An overview of the environmental risks posed by neonicotinoid insecticides. <https://www.sussex.ac.uk/webteam/gateway/file.php?name=goulson-2013-jae.pdf&site=411>
- ^{xxiv} Xerces Society: Beyond the Birds and the Bees. http://www.xerces.org/wp-content/uploads/2013/09/XercesSociety_CBCneonics_sep2013.pdf
- ^{xxv} Van Dijk, Tessa C, Van Staalduinen, Marja A, Van de Sluijs, Jeroen P. "Macro-Invertebrate Decline in Surface Water Polluted with Imadacloprid." May 2013 PLOS ONE <http://www.ontariobee.com/sites/ontariobee.com/files/neonicsandNetherlandswater2012.pdf>
- ^{xxvi} Field Crop News: Neonics or not on 2014 seed. <http://fieldcropnews.com/2013/09/neonics-or-not-on-2014-seed/>
- ^{xxvii} <http://www.omafr.gov.on.ca/english/crops/field/news/croptalk/2013/ct-0913a1.htm>
- ^{xxviii} Ibid
- ^{xxix} Better Farming, October 2013 "Corn Profit Comparisons"
- ^{xxx} Better Farming, October, 2013; "Looking for the right formula to grow high-yield corn crops in Ontario."
- ^{xxxi} "Effects of coated maize seed on honey bees: APENET project <http://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/860>
- ^{xxxii} The Western Producer: "No yield benefit from neonicotinoids: scientist" <http://www.producer.com/2013/05/no-yield-benefit-from-neonicotinoids-scientist/>
- ^{xxxiii} <http://www.michiganbees.org/2013/pioneer-announces-neonicotinoid-free-seed-offering/>
- ^{xxxiv} <http://www.omafr.gov.on.ca/english/stats/crops/ctygrcorn12.htm>
- ^{xxxv} Health Canada, Action to Protect Bees from Exposure to Neonicotinoid Pesticides, September 13, 2013. http://www.hc-sc.gc.ca/cps-spc/alt_formats/pdf/pest/part/consultations/ noi2013-01/noi2013-01-eng.pdf
- ^{xxxvi} <http://www.gfo.ca/protectingpollinators.aspx>
- ^{xxxvii} Mary Mitchell, Director PMRA in an interview on CBC "As it Happens" October 8, 2013