

# Trading Away Our Bees – webinar hosted by IATP and ARC2020

## NEONICOTINOID PESTICIDES: A science and policy review

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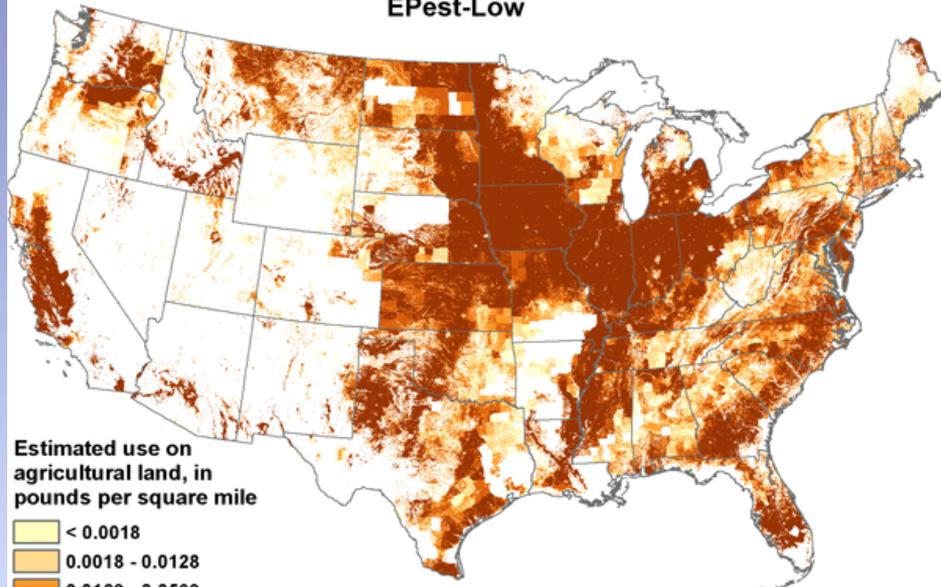
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THE EARTH'S BEST DEFENSE

## Neonicotinoid pesticides (neonics):

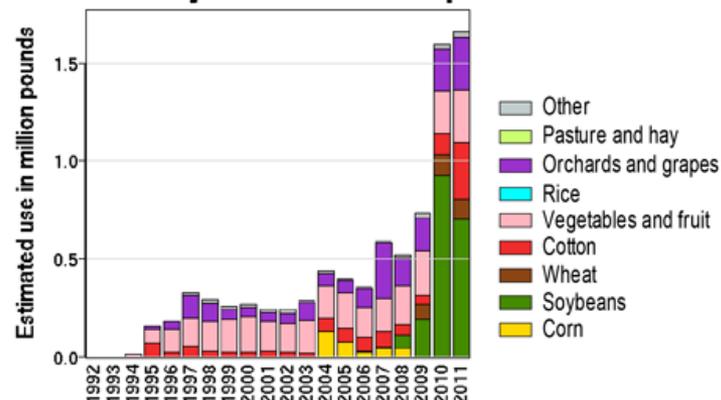
- First on market in mid-1990s
- Fastest growing and most heavily used class of insecticides in the US
- Marketed as “reduced risk” replacements for organophosphate (OP) pesticides
- Share a similar mechanism of toxicity as OPs
- Acutely toxic to bees
- Long-lasting
- Systemic

Estimated Agricultural Use for Imidacloprid , 2011

EPEst-Low



Use by Year and Crop







## **Use of treated (or coated) seeds can lead to excessive exposures to bees, other wildlife, and other plants – with no or little benefits for farmers**

At about 95 million acres annually, corn accounts for about one-quarter of all harvested land in the US, and virtually all that corn (92-95 percent) begins with a seed treated with a neonic (usually clothianidin).

Over 90 percent of canola seeds planted in North America are neonic-treated, and approximately half the soybean seeds in the US are neonic-treated.

Other neonic-treated seeds include wheat, dry beans, potatoes, winter squash including pumpkins, grass, and sunflowers.

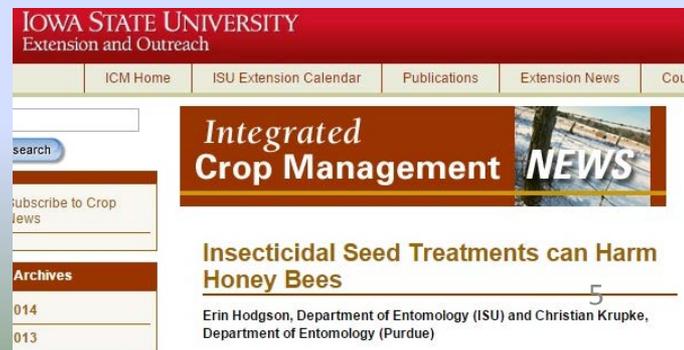
“EPA concludes that these seed treatments provide little or no overall benefits to soybean production in most situations. Published data indicate that in most cases there is no difference in soybean yield when soybean seed was treated with neonicotinoids versus not receiving any insect control treatment.” (EPA, October 2014)

(See report *Heavy Costs – Weighing the Value of Neonicotinoid Insecticides in Agriculture* by the Center for Food Safety)

A single corn kernel with neonicotinoid seed treatment contains enough active ingredient in the seed coating to kill over 80,000 honey bees.

From Krupke et al (2012)

- Bees, pollen and nectar were collected from an apiary during the corn planting season in Indiana. All dead and dying bees had traces of clothiandin, and stored pollen had high neonicotinoid levels.
- Soil samples collected from fields not planted with a seed treatment for two years still contained detectable levels of clothiandin.
- Dandelions collected from around field edges before planting had detectable levels of neonicotinoids (Fig. 2).
- Talc used as an additive for planting treated seed had extremely high levels of neonicotinoids. Planter exhaust expelling tainted talc could be coming in contact with bees or plants they forage.
- Corn pollen collected by honey bees later in the season was screened; half of the corn pollen samples analyzed had neonicotinoids.



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**Insecticidal Seed Treatments can Harm Honey Bees**

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Erin Hodgson, Department of Entomology (ISU) and Christian Krupke, Department of Entomology (Purdue)



## Home lawns and gardens can contaminate flowering plants

According to a 2013 report from Friends of the Earth US, neonicotinoids were detected in 54% of garden store plants, at levels ranging from ten to over one thousand ppb in a chopped-up mixture of stems, leaves and flowers; none of the plants were labeled or identified as containing systemic pesticides



## TOXICITY TO BEES

**Overall, the available scientific studies provide strong evidence that the levels of neonicotinoid chemical routinely detected in pollen and nectar can harm bees (for reviews see Hopwood et al 2012; Blacquiere et al 2012; Goulson 2013; van der Sluijs et al 2014).**

Honey bee studies:

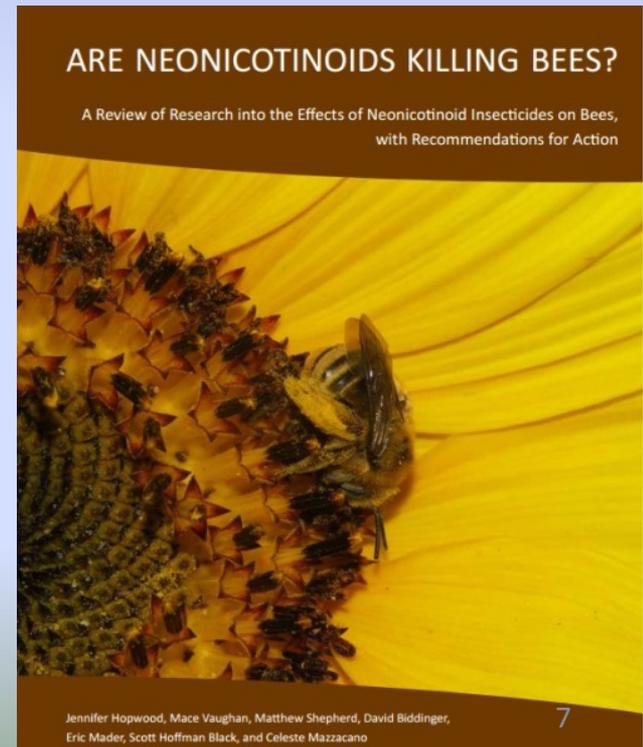
- Immune suppression
- Neurotoxicity – impaired foraging and homing ability
- Overwintering

Bumble bee studies:

- Loss of queens
- Reduced brood production
- Reduced foraging

Interaction with other pesticides and inerts

Interaction with pathogens





In June 2014, an international committee of twenty-nine scientists – the Task Force on Systemic Pesticides - reviewed over 800 peer reviewed papers published in the past five years, including industry-sponsored ones. Its assessment, called the Worldwide Integrated Assessment of the Impact of Systemic Pesticides on Biodiversity and Ecosystems (WIA), concluded that neonicotinoid pesticides are contaminating land, soil, and water, leading to toxic threats to earthworms, snails, butterflies, birds, and bees.

**In particular, they concluded that:**

- Neonics at environmentally-relevant doses over multiple seasons can harm bees by impairing smell, memory, breeding ability, and foraging and food collection.
- Some neonics are 5-10 thousand times more acutely toxic to bees than DDT.
- The metabolites, or break-down products, of neonics may be more toxic than the original pesticide.
- The classic laboratory toxicity studies, which measure short-term (acute) effects at relatively high doses, are insufficient to accurately assess the long-term (chronic) impacts to wildlife from environmentally-relevant doses.



## HUMAN RISKS –

Laboratory tests with cell cultures and rodents led the European Food Safety Authority (EFSA) to categorize two neonics – imidacloprid and acetamiprid – as possibly impairing the developing human nervous system.

Animal studies report neurobehavioral impairments in rodents that were exposed to imidacloprid prenatally, from a single high-dose injection of the pesticide to the pregnant rat. (Abou-Donia et al 2008)

Bayer DNT study reported similar findings in rats born to mothers that received daily doses of imidacloprid in their food throughout pregnancy and lactation (55-58 mg/kg/day). [EPA reviewers](#) concluded that the treatment produced persistent changes in brain structures and poor performance on some behavioral tests.

A study by NIH-funded researchers from UNC Chapel Hill and UC Davis reported that frequent exposure (self-reported by parents) to imidacloprid applied as flea and tick treatments for pets (Advantage by Bayer) during pregnancy was associated with Autism spectrum disorder (OR 2.0, 95% CI 1.0-3.9) in prenatally-exposed children (Keil et al 2014).



## EPA FIFRA 6(a)(2) POISONINGS FROM IMIDACLOPRID USE

From 1992 to 2009 a total of 22,678 incidents were reported to EPA from imidacloprid use. Incidents included poisonings of children and deaths of domestic animals. Most were from normal use of lawn and pet products.

People ate ornamental plums, developed diarrhea, recovered 4 days later. Plums had been treated with Merit 75 WSP via soil injection 6 mos previous (1997) (Bayer).

Lots of reports of people complaining of headaches, dizziness, nausea, rashes, chemical burns, burning and/or tingling sensations that last for days, itching, ocular redness and itching, asthma, shortness of breath, wheezing, hives, muscle weakness.

Most often exposures are from applying flea/tick product (Advantage) to pets, petting or sleeping with treated pets, etc. Also incidents from lawn or home treatments (Merit 75; Premise 75 water soluble packets) (Bayer).

Applicators or Greenhouse workers reported getting exposed and then sick, nausea, muscle pain, tremors, muscle weakness.

Many dog and cat incidents including seizures and deaths, mainly from either being treated (Advantage, K9 Advantix), or playing on recently treated lawn (Merit)



## IN FOOD AND WATERWAYS

There is disturbing evidence that these neonics are making their way into our food and water supply.

A study by the U.S. Geological Survey found that neonics are widespread contaminants of surface and groundwater that could be a source of drinking water. In nine rivers monitored in the Midwest, where neonics are most heavily used, the study found clothianidin in about three-quarters of monitored sites, thiamethoxam in about one-half, and imidacloprid in about one-quarter.

Limited testing from the U.S. Department of Agriculture has found neonics in fruits and vegetables, where the pesticide's systemic nature means it cannot be washed off the surface of these foods.

## FEDERAL GOVERNMENT RESPONSE

Neonics not regulated in drinking water, no MCL

EPA and USDA focus on pathogens and habitat fragmentation

EPA announced new labels for products used for outdoor foliar applications, including ornamental landscape plants (EPA, Aug 2013), to avoid spraying when bees are present. Doesn't apply to seed treatments.

The White House issued a memorandum in June 2014 directing EPA and USDA to co-chair a new Pollinator Health Task Force to develop a National Pollinator Health Strategy by the end of 2014, in which federal agencies partner with state, tribal, and local governments, farmers and ranchers, corporations and small businesses, and NGOs.

Dept. Interior will phase out use of neonics on federal wildlife refuge lands by January 2016.

EPA issued a draft report finding seed treatments of soybean do not increase crop yield significantly (Oct 2014), but wont do similar analysis on other crop seeds.



## LOCAL BANS

The Oregon Department of Agriculture has banned dinotefuran products while it reviews the registration, following a dramatic death of twenty-five thousand bumble bees in a retail store parking lot following the misapplication of dinotefuran products to flowering linden trees

Earlier this year (Feb 2014) Eugene OR became the first city in the US to ban neonics on city property, followed by Spokane WA that also passed a ban neonics on public land (30% of Spokane land area) including streets, parks, and rights of way. The bans in Eugene and Spokane do not apply to private property.

Minnesota is considering action to ban or restrict neonicotinoids – notable given the heavy agriculture presence in the state (October, 2014)



## U.S. CONGRESS

In July 2013 Congressmen John Conyers, Jr. of Michigan and Earl Blumenauer of Oregon introduced the Saving America's Pollinators Act of 2013 (H.R.2692). Orders EPA to suspend use of the most bee-toxic neonicotinoids for use in seed treatment, soil application, or foliar treatment on bee attractive plants. (A good bill)

The Conyers-Blumenauer bill has 73 cosponsors including 2 Republicans. The Blumenauer letter to EPA also got 53 cosigners, demonstrating notable support in each instance.

Congressman Scott Austin (R-GA) introduced a bill to speed up approval of pesticides that would treat bee pests. (H.R.5447; Sept 2014) (A problematic bill)

Other Democrat Members have sent letters to EPA.

## EUROPEAN UNION

In April 2013 the European Union issued a ban, effective December 2013, on the uses of seed-treatments of thiamethoxam, clothianidin, and imidacloprid, on bee-attractive flowering crops such as corn, oilseed rape and sunflowers. Ban will be reviewed in 2015. (see presentation by Martin Dermine for more details)



## CANADA

Canadian regulators have said current seed coating practices are not sustainable and announced in Sept 2013 that it would restrict neonicotinoid use in corn and soy seed production.

Canadian beekeepers have filed a class action lawsuit against Bayer CropScience Inc. and Syngenta Canada Inc. claiming C\$450 million (\$414 million) in damages for negligence related to the use of neonicotinoid insecticides. (Sept 2014)

