

# Pesticides



**Gary Fish**

**Maine Board of Pesticides Control**

**28 SHS**

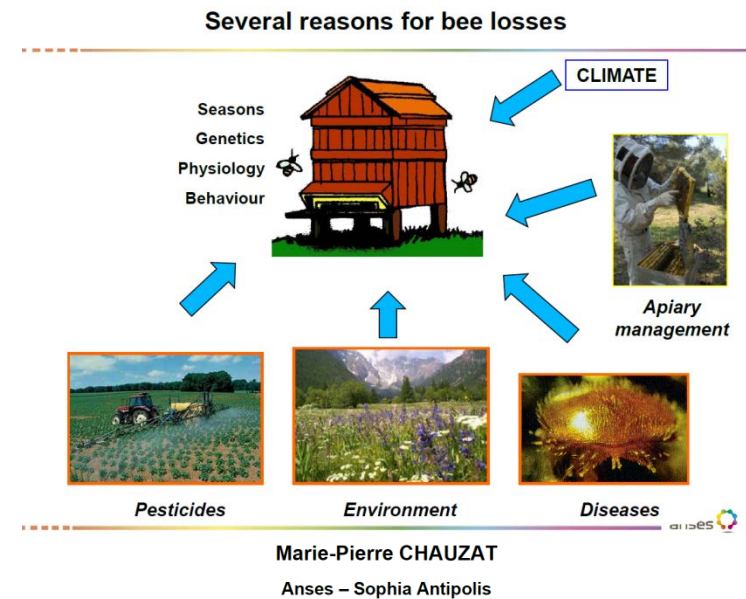
**Augusta, ME 04333-0028**

**207-287-7545**

**[gary.fish@maine.gov](mailto:gary.fish@maine.gov)**

# My premise

- \* I am not here to defend or indict pesticides
- \* I will try to outline the latest research findings
- \* I am not a bee or CCD expert by any means
- \* My head continues to spin from all the reading I have done



# Pesticide Use in NH



- \* NH agricultural production (organic and conventional) relies on many pesticide families for yield and quality
  - \* Potatoes
  - \* Apples
  - \* Vegetables
  - \* Small Fruits
  - \* Nurseries
  - \* Sod Farms
- \* Turf and Ornamental managers rely on them, and
- \* Homeowners rely on them too

2011 NH Insecticide use by licensed private and commercial applicators

| Insecticide Class      | Total Pounds  |
|------------------------|---------------|
| Organophosphates       | 6259          |
| <b>Nitro – Neonics</b> | <b>4315</b>   |
| Pyrethroids            | 4047          |
| Other                  | 3573          |
| Carbamates             | 2314          |
| Petroleum Oils         | 1840          |
| <b>Cyano – Neonics</b> | <b>90</b>     |
| <b>Total</b>           | <b>22,438</b> |

# Home & Garden (Homeowner) Use of Pesticides in Maine

8% of Conventional Pesticide Use, but 15% of the Insecticide Use

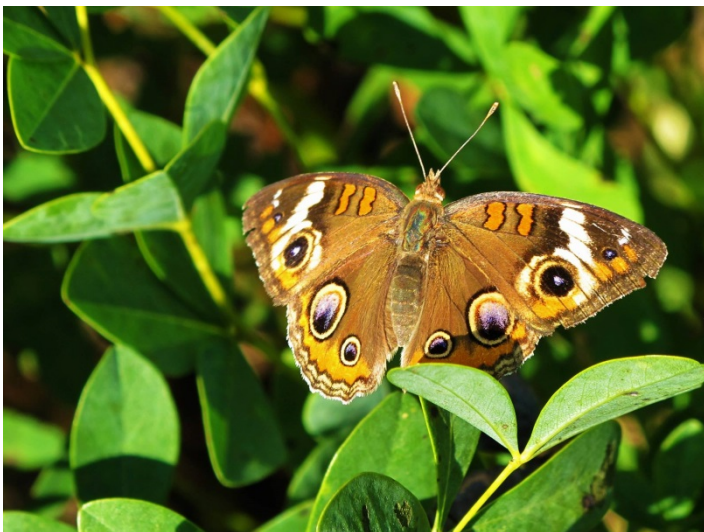
## National Data

- \* 67% herbicides
- \* 22% insecticides
- \* 11% fungicides

## Qualitative Estimate of Insecticides Sold \*

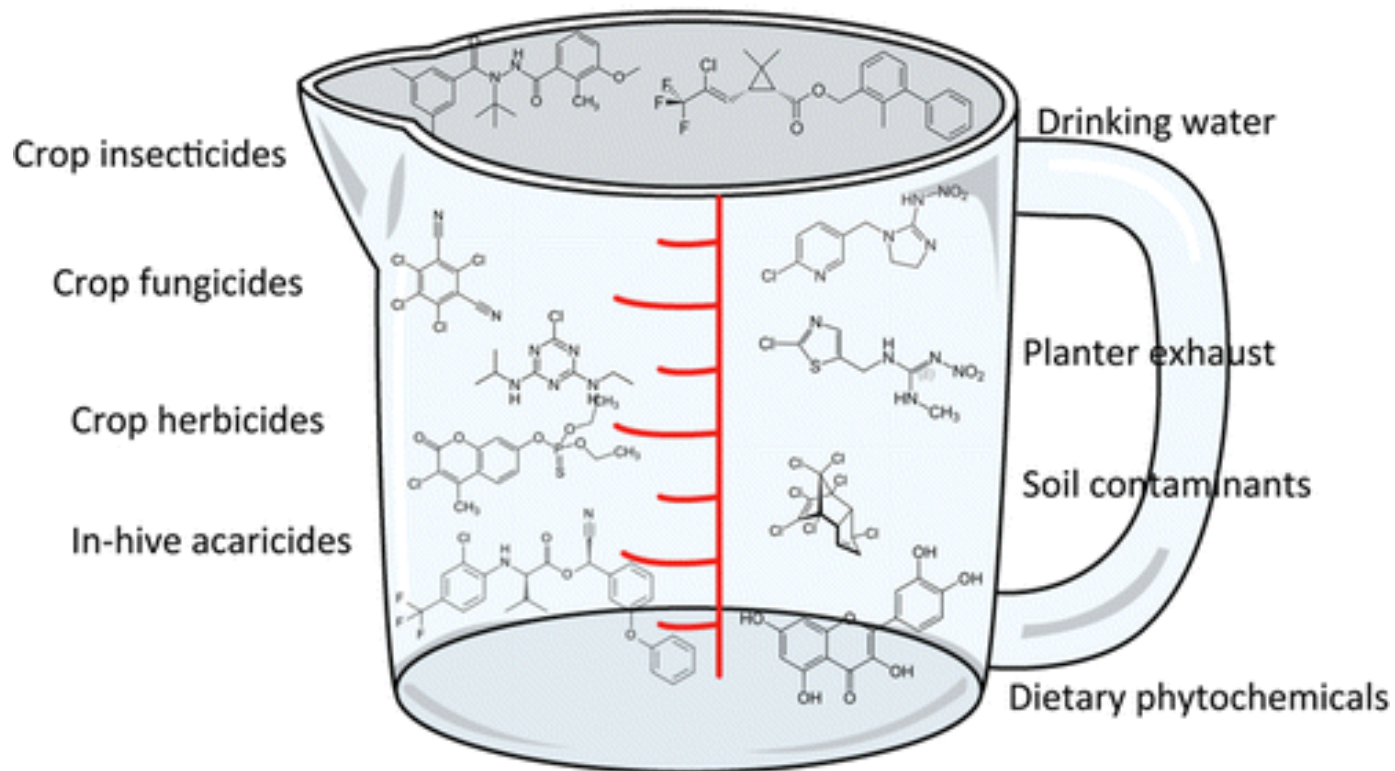
| Active Ingredient   | Number of Units Sold |
|---------------------|----------------------|
| Bifenthrin          | 18,000               |
| Cypermethrin        | 12,000               |
| Carbaryl            | 10,000               |
| Chlorantraniliprole | 7,500                |
| Imidacloprid        | 2,500                |
| Pyrethrins          | 2,100                |

\* 2013 Maine Sales Reports



# Many potential pesticide hazards exist

"Risk cup" for honey bees



# Formulation Toxicity

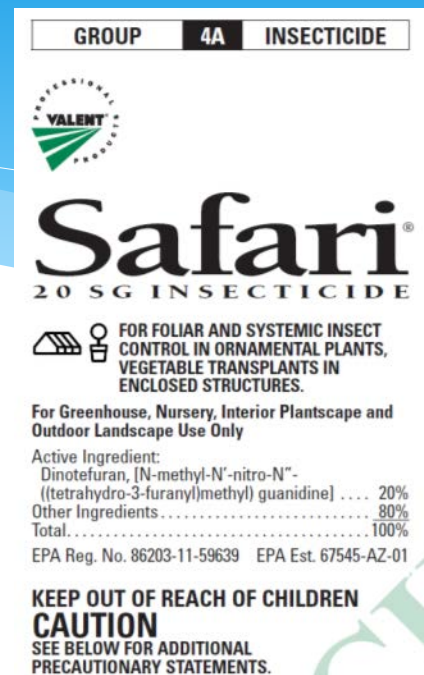
- \* Top 27 most toxic insecticide formulations to honey bee adults
- \* Tested at row crop application rates with a tower sprayer



| Chemical name                     | LC <sub>50</sub><br>mg/liter<br>(F) | LC <sub>50</sub><br>mg/liter <sup>a,b</sup><br>(AI) | Toxicity rank<br>by LC <sub>50</sub><br>(F) |
|-----------------------------------|-------------------------------------|---|---|
| Diclotophos                       | 24.92                               | 20.43   | 1   |
| Thiamethoxam                      | 62.56                               | 25.02   | 2   |
| Emamectin Benzoate                | 65.51                               | 1.41  | 3   |
| Clothianidin                      | 67.27                               | 15.88   | 4   |
| Abamectin                         | 68.32                               | 1.37  | 5   |
| Thiamethoxam +<br>l-cyhalothrin   | 107.32                              | 13.52   | 6   |
| Acephate                          | 126.43                              | 122.64  | 7   |
| Zeta-cypermethrin                 | 138.31                              | 13.28   | 8   |
| Chlorpyrifos                      | 141.10                              | 67.73   | 9   |
| Dimethoate                        | 142.78                              | 62.11   | 10  |
| Methomyl                          | 179.38                              | 52.02   | 11  |
| Cyfluthrin                        | 182.54                              | 45.16   | 12  |
| Bifenthrin +<br>avermectin        | 197.21                              | 17.43   | 13  |
| Permethrin                        | 198.25                              | 72.96   | 14  |
| Imidacloprid +<br>b-cyfluthrin    | 213.12                              | 44.76   | 15  |
| Oxamyl                            | 214.03                              | 89.89   | 16  |
| Sulfoxaflor                       | 229.50                              | 114.75  | 17  |
| Bifenthrin                        | 258.30                              | 64.83   | 18  |
| Spinosad                          | 302.26                              | 133.60  | 19  |
| Beta-cyfluthrin                   | 312.15                              | 39.64   | 20  |
| Cypermethrin                      | 332.55                              | 101.76  | 21  |
| Bifenthrin +<br>Zeta-cypermethrin | 498.31                              | 56.06   | 22  |
| Imidacloprid                      | 552.20                              | 118.17  | 23  |
| Gamma-Cyhalothrin                 | 575.31                              | 82.84   | 24  |
| Lambda-Cyhalothrin                | 575.41                              | 131.19  | 25  |
| Methoxyfenozide +<br>spinetoram   | 712.21                              | 201.56  | 26  |
| Carbaryl                          | 895.21                              | 394.79  | 27  |

# Formulation types differ in risk to pollinators

- \* More risky
  - \* Dusts
  - \* Microencapsulated
  - \* Wettable powders
  - \* Flowables
  - \* Emulsifiable concentrates
  - \* Systemic products
  - \* Some adjuvants
    - \* Super-Organosilicone surfactants



No endorsement intended or implied

OPEN ACCESS Freely available online

PLoS one

## Learning Impairment in Honey Bees Caused by Agricultural Spray Adjuvants

Timothy J. Ciarlo\*, Christopher A. Mullin, James L. Frazier, Daniel R. Schmehl

Department of Entomology, The Pennsylvania State University, University Park, Pennsylvania, United States of America

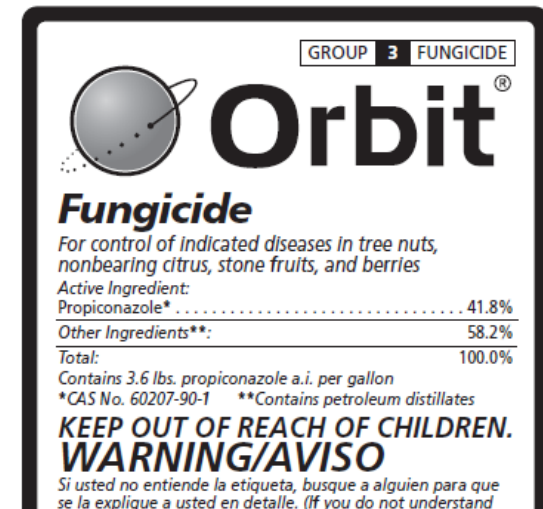
### Abstract

**Background:** Spray adjuvants are often applied to crops in conjunction with agricultural pesticides in order to boost the efficacy of the active ingredient(s). The adjuvants themselves are largely assumed to be biologically inert and are therefore subject to minimal scrutiny and toxicological testing by regulatory agencies. Honey bees are exposed to a wide array of pesticides as they conduct normal foraging operations, meaning that they are likely exposed to spray adjuvants as well. It was previously unknown whether these agrochemicals have any deleterious effects on honey bee behavior.

**Methodology/Principal Findings:** An improved, automated version of the proboscis extension reflex (PER) assay with a high degree of trial-to-trial reproducibility was used to measure the olfactory learning ability of honey bees treated orally with sublethal doses of the most widely used spray adjuvants on almonds in the Central Valley of California. Three different adjuvant classes (nonionic surfactants, crop oil concentrates, and organosilicone surfactants) were investigated in this study. Learning was impaired after ingestion of 20 µg organosilicone surfactant, indicating harmful effects on honey bees caused by agrochemicals previously believed to be innocuous. Organosilicones were more active than the nonionic adjuvants, while the crop oil concentrates were inactive. Ingestion was required for the tested adjuvant to have an effect on learning, as exposure via antennal contact only induced no level of impairment.

# Different tank mixes may also increase risk to pollinators

- \* Some combinations can be very risky...
  - \* Insecticides mixed with miticides
  - \* Insecticides mixed with fungicides or PBO
    - \* Acetamiprid (Assail) and propiconazole (Orbit)
    - \* Pyrethroids and propiconazole
    - \* Piperonyl butoxide and some neonicotinoids
- \* Avoid tank mixes entirely



No endorsement intended or implied



# Even pesticides approved for organic grower use can be highly toxic to pollinators

## Toxicity of Common Organic-Approved Pesticides to Pollinators

| PESTICIDE   | NON-TOXIC | LOW TOXICITY | HIGHLY TOXIC |
|---|-----------|--------------|--------------|
| <b>Insecticides/Repellants/Pest Barriers</b>        |           |              |              |
| <i>Bacillus thuringiensis</i> (Bt)                  | Green     |              |              |
| <i>Beauveria bassiana</i>                           |           |              | Red          |
| <i>Cydia pomonella granulosis</i>                   | Green     |              |              |
| Diatomaceous Earth                                  |           |              | Red          |
| Garlic  | Green     |              |              |
| Insecticidal Soap                                   |           |              | Red          |
| Kaolin Clay   | Green     |              |              |
| Neem  |           | Yellow       |              |
| Horticultural Oil                                   |           |              | Red          |
| Pyrethrins  |           |              | Red          |
| Rotenone  |           |              | Red          |
| Sabadilla   |           |              | Red          |
| Spinosad  |           |              | Red          |
| <b>Herbicides/Plant Growth Regulators/Adjuvants</b> |           |              |              |
| Adjuvants   |           | Yellow       |              |
| Corn Gluten   | Green     |              |              |
| Gibberellic Acid                                    | Green     |              |              |
| Horticultural Vinegar                               |           | Yellow       |              |
| <b>Fungicides</b>                                   |           |              |              |
| Copper  |           | Yellow       |              |
| Copper Sulfate                                      |           |              | Red          |
| Lime Sulfur   | Green     |              |              |
| Sulfur  |           |              | Red          |

Soaps and Oils, only when directly sprayed upon the pollinator

**INVERTEBRATE CONSERVATION FACT SHEET**

### Organic-Approved Pesticides Minimizing Risks to Pollinators



While organic farming offers significant environmental benefits, even some organic-approved pesticides can cause harm to pollinators.

By selecting the least toxic options and applying them when pollinators are not present, harm can be minimized.

Productive cropping systems do not have to rely on chemical inputs for pest control. Photograph by Matthew Shepley

Approximately five thousand species of bees are native to the United States. These wild insects provide crop pollination services, and are often specialized for foraging on particular flowers, such as tomatoes, squash, beans, orchard, or forage crops. This specialization results in efficient pollination, high yields, and larger fruit.

While the non-native European honey bee (*Apis mellifera*) is the most important managed crop pollinator, its numbers are in decline because of disease and other factors. This makes native bees, which contribute an estimated \$3 billion worth of crop pollination annually to the U.S. economy, more important than ever. Native bees are of particular importance to organic farmers because unlike honey bees, their populations can be supported without the use of antibiotics and other chemical inputs.

The reduced use of pesticides, as well as more sustainable management practices, makes organic farms an important asset in protecting our national pollinator resources. Many organic operations already have good numbers of wild bees. In some cases, these native bees can effectively provide all necessary crop pollination services when adequate habitat is available and low-toxicity management practices are implemented.

Unfortunately, however, even pesticide approved for organic agriculture can cause significant harm to bees. This fact sheet provides a brief overview of how to select and apply pesticides for organic farm operations while minimizing pollinator mortality. Keep in mind that the same practices outlined here that help protect pollinators also may protect beneficial insects such as parasitoid wasps, predators, flies and beetles, snails and various bugs, leeches, and others. The presence of these insects can further reduce pest pressure and the need for chemical treatment.

Written by Eric Mader

The Xerces Society for Invertebrate Conservation  
www.xsociety.org

# Recent research on botanical pesticides

- \* Acute Toxicity and Sublethal Effects to Honey Bees
  - \* Andiroba oil, Garlic extract, Eucalyptus oil, Rotenone, Neem oil and Citronella oil applied to adults and fed to larvae
    - \* All but Andiroba oil caused significant mortality to adult bees
    - \* Andiroba, Garlic and Neem caused significant larval mortality
      - \* These may work like insect growth regulators preventing ecdysis (moulting)



# Neonicotinoids - History

- \* Neonicotinoids are “insecticides” and of course they can and will kill bees, other pollinators, beneficials and aquatic invertebrates
- \* Came onto the market when EPA began to encourage registration of alternatives to organophosphates and carbamates
- \* Imidacloprid came first in 1994 and was originally conditionally registered for ornamental & turf uses
- \* The rest soon followed after EPA instituted a Reduced Risk (RR) and OP Alternative (OPA) accelerated registration process
  - \* Thiamethoxam – 2000
  - \* Acetamiprid – 2002
  - \* Clothianidin – 2003
  - \* Dinotefuran – 2004
- \* Thiacloprid was conditionally registered in 2003 outside of the RR/OPA program



# More history

- \* Neonicotinoids were favored for their
  - \* low mammalian toxicity
  - \* lack of mammalian CNS effects, and
  - \* lack of carcinogenic (cancer) effects
- \* Use rates are very low (ml vs pts/Ac)
- \* EPA knew all along that they had some negatives:
  - \* Very water soluble (good & bad)
  - \* very leachable (groundwater concerns)
  - \* fairly persistent in woody plants and soils



# Neonic history

- \* EPA decided right from the beginning to manage the negatives with very specific label language
- \* Ground water warnings, reduced rates, pollinator warnings, etc.
- \* EPA scientists agreed that using neonics as labeled would be a better alternative to the continued use of OPs and carbamates because:
  - \* Ops and Carbamates are much higher in mammalian toxicity, data on carcinogenicity is equivocal and nervous system effects are definite



# Recent neonic studies

- \* Assessment of Chronic Sublethal Effects of Imidacloprid on Honey Bee Colony Health
  - \* Sub-lethal effects of imidacloprid
    - \* No significant effects on foraging up to 100 ug/kg
    - \* Varroa mites significantly higher in exposed colonies
    - \* High doses in pollen “**could**” reduce colony health and reduce overwintering success
    - \* Relevant field dose from seed treated crops had negligible effects



# Recent neonic studies

- \* Neonicotinoid pesticides severely affected honey bee queens
  - \* Thiamethoxam and Clothianidin fed in pollen supplements at “environmentally relevant” concentrations
  - \* Queens’s ovaries and stored sperm affected
  - \* Flight behavior was not affected



# Recent neonic studies

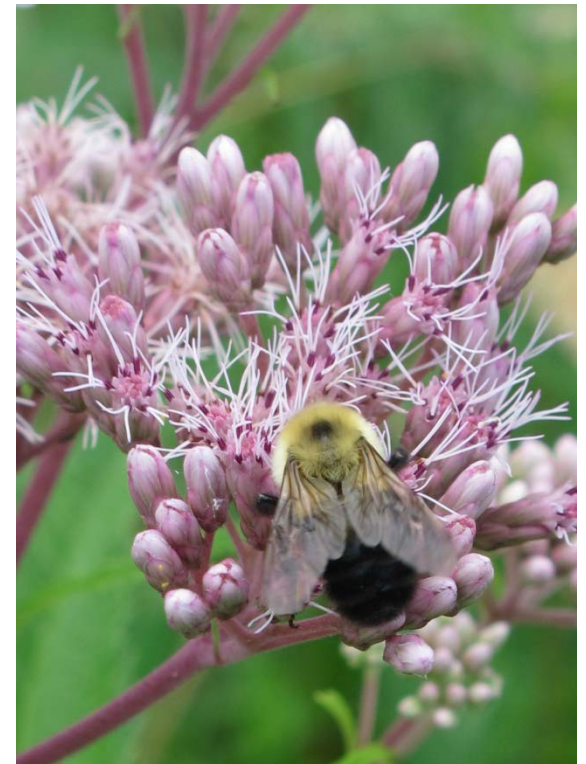
- \* Neonic seed treatments negatively affected wild bees
  - \* Clothianidin and beta-cyfluthrin treated canola seed in Swedish fields caused:
    - \* Reduced density of wild (bumble and solitary bees)
    - \* Reduced nesting in *Osmia* (solitary bee)
    - \* Reduced colony growth and reproduction in Bumblebee
    - \* No significant effects on Honey bee colony strength





# Recent neonic studies

- \* Bees prefer sucrose solutions with neonicotinoids
  - \* No feeding avoidance in honey bees and bumblebees
  - \* Both preferred solutions with imidacloprid and thiamethoxam
  - \* Those two neonics and clothianidin reduced feeding for both species
  - \* Why are they attracted to something that reduces their overall feeding?



# Future of neonicotinoids

- \* EPA is opening the re-registration docket on all the neonicotinoids
- \* EPA - “some uncertainties have been identified since their initial registration”
  - \* Environmental fate and
  - \* Effects on pollinators
- \* Concerns about persistence and bioaccumulation
  - \* Higher levels in guttation water
  - \* Higher levels expressed in soil injected woody plants
  - \* Higher levels expressed in ornamental plants

## Schedule for Review of Neonicotinoid Pesticides

The dockets for all the neonicotinoid pesticides have been opened. Our goal is to review the pesticides in this class in the same timeframe so we can ensure consistency across the class. As EPA completes risk assessments for the neonicotinoids, the Agency will pursue risk mitigation, as appropriate.

| Chemical Name and Docket Number                             | Planned Completion  | Milestones  |
|---|---|---|
| <b>Imidacloprid</b><br><a href="#">EPA-HQ-OPP-2008-0844</a> | 2016-2017   | <ul style="list-style-type: none"> <li>• initial set of risk assessments issued for public comment in 2015</li> <li>• potential early pollinator mitigation in 2015</li> <li>• remainder of risk assessments issued for public comment in 2016</li> </ul> |
| <b>Clothianidin</b><br><a href="#">EPA-HQ-OPP-2100-0865</a> | 2016-2017   | <ul style="list-style-type: none"> <li>• initial set of risk assessments issued for public comment in 2016</li> <li>• potential early pollinator mitigation in 2016</li> <li>• remainder of risk assessments issued for public comment in 2017</li> </ul> |
| <b>Thiamethoxam</b><br><a href="#">EPA-HQ-OPP-2011-0581</a> | 2016-2017   | <ul style="list-style-type: none"> <li>• initial set of risk assessments issued for public comment in 2016</li> <li>• potential early pollinator mitigation in 2016</li> <li>• remainder of risk assessments issued for public comment in 2017</li> </ul> |
| <b>Dinotefuran</b><br><a href="#">EPA-HQ-OPP-2011-0920</a>  | 2016-2017   | <ul style="list-style-type: none"> <li>• initial set of risk assessments issued for public comment in 2016</li> <li>• potential early pollinator mitigation in 2016</li> <li>• remainder of risk assessments issued for public comment in 2017</li> </ul> |
| <b>Acetamiprid</b><br><a href="#">EPA-HQ-OPP-2012-0329</a>  | 2018-2019   | Data Generation 2014-2017   |
| <b>Thiacloprid</b><br><a href="#">EPA-HQ-OPP-2012-0218</a>  | Voluntarily cancelled by registrant<br>Registration review case closure issued in November 2014 |   |

# What if...

- \* neonicotinoids are banned...
- \* Other pesticides will fill the vacuum
- \* Pyrethroids, OPs, Carbamates, Spinosad, Phorate, Chlorantraniliprole, Indoxacarb, Spinetoram, etc.
  - \* Most of these are as toxic or more toxic to bees than neonics
  - \* Some of these are also systemics
- \* What if bee declines continue?
- \* We need to look at the whole universe of exposures
  - \* insecticides, fungicides, herbicides
  - \* surfactants and other adjuvants
  - \* tank mixes and synergistic effects



# The facts about systemic insecticides

## – Richard Cowles - CAES

- \* CCD has not diminished in countries where neonicotinoid insecticide use was curtailed<sup>6</sup>,
- \* CCD is not found in Australia, where neonicotinoid insecticides are used, but where Varroa mite (a parasite and vector of bee viruses) is also not found<sup>6</sup>,
- \* 96% of colonies with CCD have been found to harbor a complex of viruses, for which Israeli Acute Paralysis Virus is most strongly implicated<sup>7</sup>;



6 Ratnieks, FLW and N. L. Carreck. 2010. Science 327: 152 - 153.

7 Cox-Foster, D. L., et al. 2007. Science 318: 283 - 287.

# Do some pesticides make bees more susceptible to disease?

\* One study shows how the miticides\* beekeepers use are the most risky for making the bees susceptible to *Nosema ceranae*

\* Relative risk of nosema was significantly worse for:

- Chlorothalonil (2.31)
- Pyraclostrobin (2.85)
- \*DMPF (Amitraz) (2.13)
- Bifenthrin (2.08)
- Endosulfan (1.60)
- \*Fluvalinate (2.43)

# Do some pesticides make bees less susceptible to disease?

- \* One study shows how some pesticides actually reduce the incidence of nosema compared to the control, including all the neonics that were found
- \* Relative risk of nosema was significantly less for:

- Captan (0.59)
- Cyprodinil (0.31)
- Difenoconazole (0.31)
- Acetamiprid (0.31)
- Carbaryl (0.42)
- \*Coumaphos (0.62)
- Diazinon (0.56)
- Esfenvalerate (0.51)
- Imidicloprid (0.31)
- Indoxacarb (0.28)
- Phosmet (0.36)
- Thiacloprid (0.35)

# What about herbicides

- \* Much more research needed to assess the impacts that herbicides have on pollinator floral resources
- \* Herbicides have been used for years
- \* Growers have always strived for clean fields and headlands
- \* Are the impacts related to the way herbicides are used or are impacts more related to the intensity of the agriculture?
- \* These questions need to be answered



# What has EPA done?

- \* EPA and the State FIFRA Issues Research and Evaluation Group (SFIREG) have been discussing better ways to label pesticides for pollinator protection since I started as a regulator in 1988
- \* Pesticide labels have always had warnings and restrictions
- \* Neonics and new systemic insecticides have new labeling to help protect pollinators

## PROTECTION OF POLLINATORS



**APPLICATION RESTRICTIONS**  
EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.



Look for the bee hazard icon in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

**This product can kill bees and other insect pollinators.**

Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- o Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- o Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- o Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- o Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to pollinator attractive habitat can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at: <http://pesticidestewardship.org/PollinatorProtection/Pages/default.aspx>. Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state, go to: [www.aapco.org/officials.html](http://www.aapco.org/officials.html). Pesticide incidents should also be reported to the National Pesticide Information Center at: [www.npic.orst.edu](http://www.npic.orst.edu) or directly to EPA at: [beekill@epa.gov](mailto:beekill@epa.gov)



# Many insecticides have specific label warnings



**BEE CAUTION:** May kill honeybees and other bees in substantial numbers. This product is highly toxic to bees exposed to direct treatment or residues on crops or weeds in bloom.

Notifying beekeepers within 1 mile of treatment area at least 48 hours before product is applied will allow them to take additional steps to protect their bees.

Limiting applications to times when bees are least active, e.g., within 2 hours of sunrise or sunset, will minimize risk to bees.

***For crops in bloom (except corn and soybeans):***

Do not apply this product to target crops or weeds in bloom.

***For corn and soybeans:***

If application cannot be avoided when target crop or weeds are in bloom, limiting applications to times when bees are least active, e.g., within 2 hours of sunrise or sunset, will minimize risk to bees.



# Look for the bee icon on new labels

- \* Products with acute or residual toxicity to pollinators will have the bee icon on their labels
- \* The new warnings will be next to that icon



# Pollinator Protection

## THE NEW EPA BEE ADVISORY BOX On EPA's new and strengthened pesticide label to protect pollinators

**PROTECTION OF POLLINATORS**

**APPLICATION RESTRICTIONS** EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.

Look for the bee hazard icon in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

**This product can kill bees and other insect pollinators.** Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at:  
<http://pesticidestewardship.org/pollinatorprotection/Pages/default.aspx>

Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state/tribe, go to: [www.epa.gov](http://www.epa.gov). Pesticide incidents can also be reported to the National Pesticide Information Center at: [www.npic.orst.edu](http://www.npic.orst.edu) or directly to EPA at: [beekill@epa.gov](mailto:beekill@epa.gov)

Alerts users to separate restrictions on the label. These prohibit certain pesticide use when bees are present.

The new bee icon helps signal the pesticide's potential hazard to bees.

Makes clear that pesticide products can kill bees and pollinators.

Bees are often present and foraging when plants and trees flower. EPA's new label makes it clear that pesticides cannot be applied until all petals have fallen.

Warns users that direct contact and ingestion could harm pollinators. EPA is working with beekeepers, growers, pesticide companies, and others to advance pesticide management practices.

Highlights the importance of avoiding drift. Sometimes, wind can cause pesticides to drift to new areas and can cause bee kills.

The science says that there are many causes for a decline in pollinator health, including pesticide exposure. EPA's new label will help protect pollinators.




Read EPA's new and strengthened label requirements: <http://go.usa.gov/jHH4>

# PROTECTION OF POLLINATORS



**APPLICATION RESTRICTIONS** EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.



Look for the bee hazard icon  in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.



**This product can kill bees and other insect pollinators.**

Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to pollinator attractive habitat can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at:

<http://pesticidestewardship.org/PollinatorProtection/Pages/default.aspx>.

Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state, go to: [www.aapco.org/officials.html](http://www.aapco.org/officials.html). Pesticide incidents should also be reported to the National Pesticide Information Center at: [www.npic.orst.edu](http://www.npic.orst.edu) or directly to EPA at: [beekill@epa.gov](mailto:beekill@epa.gov)

# New use directions – Ag products

## **2. FOR FOOD CROPS AND COMMERCIALY GROWN ORNAMENTALS NOT UNDER CONTRACT FOR POLLINATION SERVICES BUT ARE ATTRACTIVE TO POLLINATORS**



**Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen unless one of the following conditions is met:**

- **The application is made to the target site after sunset**
- **The application is made to the target site when temperatures are below 55°F**
- **The application is made in accordance with a government-initiated public health response**
- **The application is made in accordance with an active state-administered apiary registry program where beekeepers are notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying**

# New use directions – Ag products

- **The application is made due to an imminent threat of significant crop loss, and a documented determination consistent with an IPM plan or predetermined economic threshold is met. Every effort should be made to notify beekeepers no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying.**



# New use directions – Non-Ag products

## 3. Non-Agricultural Products:



**Do not apply [insert name of product] while bees are foraging. Do not apply [insert name of product] to plants that are flowering. Only apply after all flower petals have fallen off.**





# Maine DACF Pollinator protection plan

- \* The Maine DACF developed a pollinator plan
- \* It is based on the North Dakota plan
- \* It stresses voluntary measures such as education, BMPs and communication
- \* It does not contain any new regulatory requirements

Maine Department of Agriculture,  
Conservation and Forestry

POLLINATOR PROTECTION PLAN  
2015

*Walter E. Whitcomb*, Commissioner  
*Ellis Additon*, Director, Bureau of Agriculture,  
Food, and Rural Resources

# Plan contents

- \* **Challenges Faced by Beekeepers**
- \* **Challenges Faced by Growers and Pesticide Users**
- \* **DACF Activities Committed to Pollinator Health**
- \* **Best Management Practices**
  - \* **Beekeeper Best Management Practices**
  - \* **Landowner/Grower/Agency Best Management Practices**
  - \* **Pesticide User Best Management Practices**
- \* **Supporting Pollinator Forage and Habitat**



# Summary

- \* Insecticides do kill bees
- \* Both growers and bee keepers need to follow BMPs and practice IPM to reduce the overall impacts of pesticides on bees
- \* Fungicides need to be carefully evaluated for effects on immature bees
- \* Overall grower practices (including herbicide use) need to be evaluated for reductions in floral resources
- \* Scientists, growers and bee keepers need to work together to help figure out the risks and benefits of pesticide use



# Questions?

\* That's all folks!

