Pesticides & Pollinators: Brief Overview

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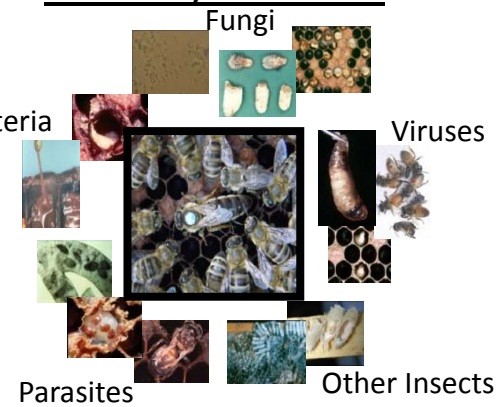
Factors Associated with Bee Declines

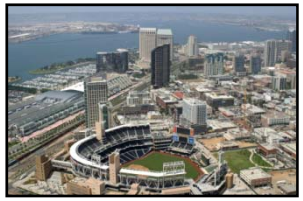
•USDA has identified multiple factors; no single factor identified as "cause".

Disease/Parasites



Agricultural Practices

Urbanization



Bee Management Practices

Source: USDA Agricultural Research Service

Pesticides

Nutrition

Pesticides/pollinators

- Types:
  - Insecticides, fungicides, herbicides
  - Most relevant to pollinators exposure: hive management, foliar ag & non-ag outdoor applications, treated seeds (dust-off), soil drench, organic and conventional
  - Toxicity: acute, chronic, sub-acute effects

- Federal
  - Labeling changes dramatic in the past few years (e.g., pollinator protection box)
  - Registration toxicity testing requirements
  - Reevaluation of 76+ active ingredients

- State
  - Treated article legislation
  - Pesticide Use Impact Assessment on state lands
  - Environmental monitoring
  - Regulations

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.aapco.org. Pesticide incidents can also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: 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.

EPA

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

Proposed Data Requirements

Table 2. 40 CFR Part 158, Subpart G (Ecological Effects §158.630) Terrestrial and Aquatic Non-Target Organisms Data Requirements

Number	Data Requirement	Use Pattern						Test substance	Test Note No.
		Terrestrial	Aquatic	Forestry	Residential Outdoor †	Greenhouse	Indoor		
Insect Pollinator Testing									
850.3020	Honey bee adult acute contact toxicity	R	R	R	R	R	NR	TGAI	1, 26
	Honey bee adult acute oral toxicity	R	R	R	R	R	NR	TGAI	1, 26
	Honey bee larvae acute oral toxicity	R	CR	R	R	CR	NR	TGAI	1, 25
	Honey bee adult chronic oral toxicity	R	CR	R	R	CR	NR	TGAI	1, 25
	Honey bee larvae chronic oral toxicity	R	CR	R	R	CR	NR	TGAI	1, 25
850.3030	Honey bee toxicity of residues on foliage	CR	CR	CR	CR	NR	NR	TEP	24
	Semi-field testing for pollinators	CR	CR	CR	CR	CR	NR	TEP	25
850.3040	Field testing for pollinators	CR	CR	CR	CR	NR	NR	TEP	25

Acute Toxicity – New Labeling Proposal

Honeybee acute 96-hr contact LC_{50} values

Chemical	LC_{50} µg a.i./bee
Bifenthrin	0.015
Zeta-cypermethrin	0.023
Thiamethoxam	0.024
Spinetoram	0.024
Chlorpyrifos	0.059
Imidacloprid	0.078
Sulfoxaflor	0.38
Abamectin	0.54
Acephate	1.2
Acetamiprid	<12.5
Flupyradifurone	122 ←
Pyriproxyfen	>100
Spirotetramat	>100
Fenpropathrin	N/A

76 active ingredients that are toxic to bees including most insecticides and some herbicides

76 active ingredients

Appendix A – List of Registered Active Ingredients That Meet the Acute Toxicity Criteria

Abamectin	Acephate	Acetamiprid	Aldicarb	Alpha-cypermethrin	Amitraz
Arsenic acid	Azadirachtin	Bensulide	Beta-cyfluthrin	Bifenazate	Bifenthrin
Carbaryl	Carbofuran	Chlorethoxyfos	Chlorfenapyr	Chlorpyrifos	Chlorpyrifos Methyl
Clothianidin	Cyantraniliprole	Cyfluthrin	Cypermethrin	Cypenothrin	Deltamethrin
Diazinon	Dichlorvos	Dicrotophos	Dimethoate	Dinotefuran	Diuron
D-trans-allethrin	Emamectin benzoate	Endosulfan	Esfenvalerate	Ethoprop	Etofenprox
Fenazaquin	Fenitrothion	Fenpropathrin	Fipronil	Fluvalinate	Fosthiazate
Gamma-cyhalothrin	Imidacloprid	Imiprothrin	Indoxacarb	Lambda-cyhalothrin	Melathion
Metaflumizone	Methiocarb	Methomyl	Momfluorothrin	Naled	Oxamyl
Permethrin	Phenothrin	Phorate	Phosmet	Pirimiphos-methyl	Prallethrin
Profenofos	Propoxur	Pyrethrins	Pyridaben	Resmethrin	Rotenone
Sethoxydim	Spinetoram	Spinosad	Sulfoxaflor	Tefluthrin	Tetrachlorvinphos
Tetramethrin	Thiamethoxam	Tolfenpyrad	Zeta-cypermethrin		

Bee hive emergency exemptions miticides

No other group has received this many Emergency Exemptions (Section 18 of FIFRA)

723 Section 18s issued to Protect Bees, 1999 – 2014

1999	41 **Coumaphos***	2008	5 Fenpyroximate
2000	45 **Coumaphos**	2009	23 Fenpyroximate
2001	46 **Coumaphos**	2010	5 Fenpyroximate, 3 Hop Beta Acids
2002	47 **Coumaphos**, 2 **Thymol**	2011	5 Fenpyroximate, 19 Hop Beta Acids
2003	45 **Coumaphos**, 20 **Thymol**	2012	30 Hop Beta Acids
2004	45 **Coumaphos**, 31 **Thymol**	2013	38 Hop Beta Acids, 31 **Amitraz**
2005	45 **Coumaphos**, 35 **Thymol**	2014	37 Hop Beta Acids
2006	40 **Coumaphos**, 35 **Thymol**		
2007	39 **Coumaphos**, 19 Fenpyroximate		

Coumaphos/honey, beeswax = the only Section 18 OP tolerances since FQPA

Registration of Oxalic Acid

- PennState: urged to register oxalic acid for Varroa
- Oxalic acid is registered in Canada and Europe
- EPA initiated the registration action
  - Obtained Canadian reviews under the “work share” agreement
  - EPA asked USDA to serve as the Registrant of Record
  - EPA found a distributor, obtained a commitment

Proposal to Mitigate Acute Risk to Bees: Commercial Pollination

- Label restriction prohibiting applications while bees are onsite under contract for pollination services
- All FIFRA Section 3 and 24(c) products that have:
  - Liquid or dust formulations
  - Foliar use directions for crops that utilize commercial pollination
  - Acute contact toxicity LD_{50} < 11 µg/bee
- Section 18 petitions considered case-by-case

State Managed
Pollinator Protection Plans (MP3s)

"Solving at the Local Level"

- Several states have been working through this issue at the state level by engaging stakeholders (growers, applicators and beekeepers) and developing state pollinator protection plans
  - Voluntary: California, Colorado, Florida, North Dakota, Mississippi
  - Regulatory: California, Iowa
  - About 38 other states have begun the stakeholder process (Vermont)
- These plans serve as examples of effective communication and collaboration between stakeholders at the local level
- Guidance for states on the development of plans

Neonicotinoids

- Systemic
- Foliar/treated seeds/drenches/injections
- EPA/CA/PMRA timeline; reevaluation 2017
  - Treated article authority. Unique to Vermont
  - Exposure in Vermont-report
    - Pollen results

Reducing Exposure from Seed Dust the "Seed Bag Tag"

- "This compound may be highly toxic to bees exposed directly (contact). Ensure that planting equipment is functioning properly in accordance with manufacturing recommendations to minimize seed coat abrasion during planting to reduce dust which can drift to blooming crops and weeds."