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UF IFAS Extension UNIVERSITY of FLORIDA

PI271

Pesticide Labeling: Protection of Pollinators[1]

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Introduction

This document outlines the highlights of the EPA's *Policy to Mitigate the Acute Risk to Bees from Pesticide Products*.

Background

Over the past decade, increasing attention has been paid to the decline in managed honey bee populations (*Apis mellifera*). Originally, the losses were discussed in context with Colony Collapse Disorder (CCD), a phenomenon first reported in 2006. However, they are now referred to as elevated colony losses, or colony losses, for short. Today, colony losses remain an important research topic, and scientists have been unable to pinpoint any one factor that contributes most to these losses. Honey bee diet; lack of quality forage; poor queens; pests and parasites (especially mites); as well as pesticide exposure are among a multitude of stressors that may negatively impact bees. Certain pesticide active ingredients are known to have negative and long-term impacts on bees, other pollinators, and beneficial arthropods. Others have minimal or no impacts on these animals.

On May 29, 2015, the EPA published its *Proposal to Mitigate Exposure to Bees from Acutely Toxic Pesticide Products*. In the proposed Acute Risk Mitigation Strategy, the EPA described additional pesticide label restrictions put in place to protect managed bees under contract pollination services from foliar applications of pesticides that are acutely toxic to bees on a contact exposure basis. Acutely toxic is defined as a pesticide with a 48 to 96-hour median lethal contact dose to 50% of the bees tested (LD_{50}) and of less than 11 micrograms per bee (LD_{50}<11 µg/bee). The proposed restrictions would prohibit applications of pesticide products that are acutely toxic to bees during bloom where honey bees are known to be present under contract for pollination services.

On January 12, 2017, following a public comment period, the EPA announced its *Policy to Mitigate the Acute Risk to Bees from Pesticide Products*. This policy represents the EPA's recommended labeling statements to mitigate acute risks to bees from pesticide products. This policy is not a regulation or an order and, therefore, does not legally compel changes to pesticide product registrations. In the event that pesticide registrants fail to voluntarily to adopt the labeling language recommended in this policy, the EPA can only compel changes to pesticide product labeling through the procedures specified in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The EPA may decide to follow the policy, or to act at variance with the policy, based on analysis of specific circumstances when reviewing specific pesticide products.

Current Pesticide Label Environmental Hazards Language

In 2014, the State FIFRA Issues Research and Evaluation Group (SFIREG) pointed out that language identified in the *Environmental Hazards – pollinating insect hazards* section, created potential confusion with other label language intended to protect pollinators. The Environmental

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Hazards language that created the potential confusion is the following:

"Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area."

When noting the potential for confusion, SFIREG was referring to an action by the EPA in 2013 where the EPA required specific pollinator protection language for all products containing one of the four nitroguanidine neonicotinoid insecticides (i.e., imidacloprid, clothianidin, thiamethoxam, and dinotefuran). This pollinator protection language prohibited the application of neonicotinoid products to bee-attractive crops during bloom, unless certain conditions were met. Since it was noted by SFIREG that environmental hazards language is intended to provide general information, it is often broad. It also noted that the language of the *Environmental Hazards – pollinating insect hazards* section contradicted the pollinator protection language required for neonicotinoid products because the environmental hazard wording was broader than the language in the use directions. As written, the broad and directive nature of the existing *Environmental Hazards – pollinating insect hazards* language appeared to supersede the neonicotinoid pollinator protection language.

Modified Environmental Hazard Language for Pollinating Insects

In order to reduce confusion between the *Environmental Hazards – pollinating insect hazards* statement and the neonicotinoid pollinator protection language, SFIREG recommended that the EPA modify the environmental hazard language so that it is not more restrictive than the specific neonicotinoid pollinator protection language. The EPA intends that with the 2017 policy, pesticide registrants with labels for products registered for foliar application to a flowering crop(s) with an application rate that exceeds the honey bee acute risk level of concern (LOC) of 0.4, submit amended labels to reflect the acute risk mitigation language. The acute risk LOC of 0.4 is the level that is 40% of the dose that caused one half of bees to die in relevant acute toxicology studies. Labels submitted to incorporate the acute risk mitigation label language should also revise the *Environmental Hazards - pollinating insect hazard statement* consistent with the following:

Environmental Hazard Language for Pollinating Insects

This product is [moderately/highly] toxic to bees and other pollinating insects exposed to direct treatment or to residues in/on blooming crops or weeds. Protect pollinating insects by following label directions intended to minimize drift and reduce pesticide risk to these organisms.

The EPA finalized its *Policy to Mitigate the Acute Risk to Bees from Pesticide Products* in January 2017. It describes methods for addressing acute risks to bees from pesticides. Applications of acutely toxic pesticides would be prohibited under certain conditions when bees are most likely to be present. While the restrictions focus on managed bees under contract pollination services, the EPA believes that these measures will also protect native bees and other pollinators that are in and around treatment areas.

The policy generally applies to all products that meet all of the following criteria:

- liquid or dust formulations as applied;
- outdoor foliar use directions on agricultural crop(s) that may utilize contract pollination services; and
- maximum application rate(s) that result in risk estimates that exceed the acute risk LOC for bees of 0.4 (based on contact exposure).

For this policy, the EPA has identified the active ingredients (Table 1) for which there are products that (1) are applied as either a liquid or a dust and (2) have foliar applications on agricultural crops that may utilize contract pollination services (Tables 2 and 3). The EPA has divided this list of active ingredients into three groups. Active ingredients placed into Group 1 are those active ingredients that are subject to this policy and that are acutely toxic to bees by contact (LD_{50} <11µg/bee). Active ingredients placed into Group 2 are those active ingredients that are subject to this policy and are not acutely toxic to bees by contact (LD_{50}>11µg/bee), but that either have been implicated in bee kills and/or whose residues have been found on bees or in pollen or wax. Finally, Group 3 will contain all remaining active ingredients that are subject to this policy. At this time, the EPA is providing a list of active ingredients in Group 1. For each active ingredient in Group 1, the EPA has identified the application rate above which the Tier 1 acute risk LOC is exceeded. In the future, as it continues to implement this policy, the EPA will identify the active ingredients of Group 2 and Group 3.

The label restrictions outlined in the policy would not replace more restrictive chemical-specific, bee-protective provisions (e.g., pre-bloom restrictions) that may already be included on a product label. For example, based on a chemical-specific assessment, the EPA may have determined that the residues of a pesticide measured in

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pollen and nectar warrant that an application be prohibited for a crop or crops for a period of time prior to bloom (i.e., a pre-bloom restriction) in addition to prohibitions during bloom, to mitigate the potential risk to bees. The EPA generally intends to carry out this policy by seeking to have pesticide registrants with products that meet the three criteria identified submit revised labels. The EPA will review all labels and make a determination, on a case-by-case basis, about whether the acute risk mitigation restriction is needed or not for that label and whether, in cases where specific pollinator-protection language exists on a label (i.e., pollinator protection language predicated on a chemical-specific risk assessment), such language should be retained in favor of the label language outlined in this policy.

In this policy, the EPA refers to honey bees as the bee most associated with commercial pollination services. However, the EPA is aware that other bee species may also be employed for contracted pollination services. This policy applies to any bee species that is contracted for pollination services.

The EPA's intent of this policy is to protect bees that provide pollination services from acute risks of pesticide products. The EPA intends that through chemical-specific analyses, and not this policy, it will evaluate other potential pesticide risks to bees, such as chronic risk through dietary exposure.

Acute Risk Mitigation Label Language

The EPA intends that all labels for products that (1) are applied as either a liquid or a dust; (2) are foliar applied outdoors to agricultural crop(s) that may utilize contract pollination services; and (3) have an application rate(s) that results in risk estimates exceeding the acute risk LOC of 0.4 for bees, be amended to reflect the following acute risk mitigation language:

> FOR FOLIAR APPLICATIONS OF THIS PRODUCT TO A CROP WHERE BEES ARE UNDER CONTRACT TO POLLINATE THAT CROP: Foliar application of this product is prohibited to a crop from onset of flowering until flowering is complete when bees are under contract for pollination services to that crop unless the application is made to prevent or control a threat to public and/or animal health as determined by a state, tribal, authorized local health department or vector control agency.

Low Risk Mitigation Label Language

In consideration of public comments received and to better account for the variability in pollinator risks and impacts on crop production, the EPA has revised its approach to be more flexible by providing specific exceptions to the acute risk mitigation label restriction. In addition to the exception for applications for public health, the EPA has identified two types of exceptions to the label restriction that it believes will still mitigate potential exposure to bees while providing flexibility to growers. One type of exception is product-based and is predicated on an acceptable residual toxicity time (RT_{25}) that is short.

For products with low acute residual toxicity, the label language is modified based on RT_{25} data. The RT_{25} is the time needed to reduce the toxicity of a pesticide product's residues and to bring mortality down to 25% for adult bees exposed by contact to field-weathered residues on the surfaces of the treated plants. Where foliage residues indicate an RT_{25} value of six hours or less (RT_{25} <6 hrs.), then the acute risk mitigation language can be amended to the following:

FOR FOLIAR APPLICATIONS OF THIS PRODUCT TO A CROP WHERE BEES ARE UNDER CONTRACT TO POLLINATE THAT CROP: This product has a Residual Toxicity time of <6 hours (RT_{25} <6 hrs.). Foliar application of this product is prohibited to a crop from onset of flowering until flowering is complete when bees are under contract for pollination services to that crop unless:

- The application is made to prevent or control a threat to public and/or animal health as determined by a state, tribal, authorized local health department, or vector control agency; OR,
- The application is made in the time period between two hours prior to sunset and eight hours prior to sunrise.

Indeterminate Crop Grown for Seed Risk Mitigation Label Language

The EPA will generally permit modification of the label restriction for crops that utilize commercial pollination services **and** have an indeterminate blooming period. The policy uses the term "indeterminate bloom" to indicate crops that bloom either continuously or intermittently for multiple weeks and/or for most of the crop's growing season or that bloom for longer than four consecutive weeks.

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Pesticide applications to such crops may be made during specified time windows or under certain temperature conditions. The indeterminate blooming crops for which the modification to the acute risk mitigation language applies are identified in Table 3 and include, but are not limited to crops such as:

- Avocado,
- Crops grown for seed, such as groundcovers, forages, oilseed, and fruit/vegetable crops,
- Cucurbits (such as melons, cucumbers, squash, pumpkins),
- Oilseed crops (including sunflower), and
- Strawberries.

The EPA intends that all labels for products that (1) are applied as either a liquid or a dust; (2) are foliar applied outdoors to agricultural crop(s) that may utilize contract pollination services; and (3) have an application rate(s) that results in risk estimates exceeding the acute risk LOC of 0.4 for bees, be amended to reflect the acute risk mitigation language. If that product is registered for use on a crop(s) that has extended or indeterminate bloom or crop(s) that are grown for seed, the acute risk mitigation language may be modified to the following:

FOR FOLIAR APPLICATIONS OF THIS PRODUCT TO A CROP WHERE BEES ARE UNDER CONTRACT TO POLLINATE THAT CROP: Foliar application of this product is prohibited to a crop from onset of flowering until flowering is complete when bees are under contract for pollination services to that crop unless:

- the application is being made to prevent or control a threat to public and/or animal health as determined by a state, tribal, authorized local health department, or vector control agency; OR,
- the application is being made in the time period between two hours prior to sunset until sunrise; OR,
- the application is being made at a time when the temperature at the application site is 50 degrees F or less.

Public Health Application Risk Mitigation Label Language

The EPA believes that the protection of public health is of paramount importance and will retain this exemption, but has revised the label language:

FOR FOLIAR APPLICATIONS OF THIS PRODUCT TO A CROP WHERE BEES ARE UNDER CONTRACT TO POLLINATE THAT CROP: Foliar application of this product is prohibited to [*crop*] from onset of flowering until flowering is complete when bees are under contract for pollination services to [*crop*] *unless the application is made to prevent or control a threat to public and/or animal health as determined by a state, tribal, authorized local health department or vector control agency.*

Vector control is an important role of local governments, who also understand the concerns about protecting pollinators. In light of efforts to control the mosquitoes capable of transmitting Zika virus, local governments have begun to focus on ways to minimize adverse effects of mosquito control efforts on bees. Several counties in Florida, for example, have created websites with information on measures that can protect bees, such as locating bees away from populated areas where mosquito spraying is targeted, or locating them in no-spray areas. Above all, local governments encourage beekeepers to communicate with the authorities of their mosquito control district to discuss concerns and solutions for protecting public health and protecting bees. For concerns regarding bees and public or animal health emergencies, individuals should contact their local authorities.

Summary

The EPA has identified the active ingredients with at least one product labeled for either foliar liquid or dust application to a crop for which contracted bees may be used. Products that meet both of these criteria are generally presumed to be subject to the *Policy to Mitigate the Acute Risk to Bees from Pesticide Products.* The EPA will send letters to registrants who have agricultural products containing active ingredients identified in Group 1 regarding (1) the acute risk mitigation labeling the EPA believes is necessary to ensure that the product provides appropriate mitigation of acute risks to managed bees and (2) the revised Environmental Hazards labeling. While the EPA has attempted to ensure that the active ingredients listed in Table 1 account for all current products covered by this policy, the EPA does not intend this list to serve as the exclusive list of active ingredients covered by the policy. Once the EPA has completed processing the revised labels for pesticide products that contain active ingredients in Group 1, it will then issue letters to registrants who have agricultural product(s) containing active ingredients identified in Group 2, and later to those registrants who have agricultural products containing active ingredients identified in Group 3. The EPA intends to implement pollinator risk management through the registration review process and not through this policy.

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Additional Information

Fishel, F.M., J. Ellis, and G. McAvoy. 2014. *Minimizing Honey Bee Exposure to Pesticides.* ENY-162/IN1027. Gainesville: University of Florida Institute of Food and Agricultural Sciences. https://edis.ifas.ufl.edu/in1027.

US EPA. 2017. *Policy to Mitigate the Acute Risk to Bees from Pesticide Products.* EPA-HQ-OPP-2014-0818-0477. United States Environmental Protection Agency. https://www.epa.gov/pesticides/epa-finalizes-steps-better-protect-bees-pesticides

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Table 1. Pesticide active ingredients, acute toxicity, acute contact toxicity classification, and maximum foliar application rate that is below the Group 1 acute risk of 0.4.

Active ingredient	Acute contact toxicity value (microgram/bee)	Acute contact toxicity classification	Maximum foliar application rate (lb ai/A) that is below the Tier 1 acute risk LOC of 0.4
Abamectin	0.54	Highly	0.0780
Acephate	1.2	Highly	0.1733
Alpha-cypermethrin	0.023	Highly	0.0033
Beta cyfluthrin	0.0120	Highly	0.0017
Bifenazate	7.8	Moderately	0.1267
Bifenthrin	0.0146	Highly	0.0021
Carbaryl	1.1	Highly	0.1589
Chlorpyrifos	0.059	Highly	0.0085
Clothianidin	0.0275	Highly	0.0040
Cyantraniliprole	0.058	Highly	0.0084
Cyfluthrin	0.037	Highly	0.0053
Cypermethrin	0.023	Highly	0.0033
Deltamethrin	0.0015	Highly	0.0002
Diazinon	0.052	Highly	0.0075
Dimethoate	0.16	Highly	0.0231
Dinotefuran	0.047	Highly	0.0068
Emamectin benzoate	0.0035	Highly	0.0005
Esfenvalerate	0.0172	Highly	0.0025
Fenazaquin	1.12	Highly	0.1618
Fenpropathrin	0.0015	Highly	0.0002
Fluazinam	4.0	Moderately	0.5778
Gamma cyhalothrin	0.0061	Highly	0.0009
Imidacloprid	0.0439	Highly	0.0063
Indoxacarb	0.1800	Highly	0.0260
Lambda-cyhalothrin	0.0380	Highly	0.0055
Malathion	0.189	Highly	0.0273
Methomyl	0.068	Highly	0.0098
Naled	0.4800	Highly	0.0693
Oxamyl	0.3100	Highly	0.0448
Permethrin	0.024	Highly	0.0035
Phosmet	1.06	Highly	0.1531
Pyrethrins	0.022	Highly	0.0032
Pyridaben	0.024	Highly	0.0035
Sethoxydim	10	Moderately	1.4444
Spinetoram (mixture of spinetoram-J and spinetoram-L)	0.0240	Highly	0.0035
Spinetoram (major component 4,5-dihydro)	0.024	Highly	0.0035
Spinetoram (minor component 4-methyl)	0.0267	Highly	0.0039
Spinosad	0.0029	Highly	0.0004
Sulfoxaflor	0.13	Highly	0.0188
Thiamethoxam	0.0240	Highly	0.0035
Tolfenpyrad	0.47	Highly	0.0679
Zeta-cypermethrin	0.023	Highly	0.0033

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Table 2. List of crops for which contracted bees may be used.[1] The crop groups listed below are those that may use bees under contract for pollination services but may not have indeterminate bloom periods.

Crop group	Crop group classification number(s)[2]	Examples
pome fruit group	11, 11-10	apple, Asian pear, crabapple, pear
stone fruit group	12, 12-12	apricot, cherry (sweet and tart), nectarine, peach, plum, plumcot, prune, sloe (12-12)
berries group	13	blackberry, blueberry (highbush and lowbush), raspberry
berry and small fruit group except strawberry	13-07	blackberry, blueberry (highbush and lowbush), cranberry, kiwifruit, raspberry
tree nut group	14, 14-12	almond, chestnut

[1]The EPA has developed this list based upon professional opinion and source material such as the USDA document, *Attractiveness of Agricultural Crops to Pollinating Bees for the Collection of Nectar and/or Pollen*. Other crops and/or crop groups that meet the subject criteria, but that are not listed here, may exist.
[2]Crop groupings allow the EPA to establish pesticide tolerances for multiple related crops based upon data for a representative set of crops.

Table 3. Crops that have indeterminate bloom or that may be grown for seed.[1] The crop groups listed below are those that may use bees under contract for pollination services and may have indeterminate bloom periods.

Crop group	Crop group classification number(s)	Examples
cucurbit vegetables group	9	pumpkin, cucumber, gherkin, squash, gourd, *Momordica* spp. (balsam apple, balsam pear, bitter melon, Chinese cucumber, watermelon)
berry and small fruit, strawberry only	13-07	strawberry
tropical and subtropical fruit, inedible peel group	24	avocado
root and tuber vegetables, leaves of root and tuber group	1[2], 2[2]	carrot, radish, rutabaga, turnip, beets, sugar beets
bulb vegetable group	3, 3-07[2]	onion, garlic, leeks
leafy vegetables (except Brassica)	4[2]	celery, lettuce, spinach
leafy vegetable group	4-16[2]	celery, cilantro, collards, kohlrabi, lettuce, spinach
brassica (cole) leafy vegetables	5[2]	broccoli, Brussels sprouts, cauliflower, cabbage, collards, kale, kohlrabi
brassica head and stem vegetables	5-16[2]	broccoli, Brussels sprouts, cauliflower, cabbage
legume vegetables (succulent or dried)	6[2]	bean, lentil, chickpea, peas, soybean
fruiting vegetable group	8, 8-10[2]	pepper, tomato, eggplant
cereal grains group	15[2]	buckwheat
nongrass animal feeds (forage, fodder, straw, and hay)	18[2]	alfalfa, clover for forage and silage, vetch
herbs and spices group	19[2]	borage
oilseed group	20[2]	borage, rapeseed, canola, safflower, sunflower
stalk, stem, and leaf petiole vegetable group	22[2]	asparagus, celery, kohlrabi

[1]The EPA has developed this list based upon professional opinion and source material such as the USDA document, *Attractiveness of Agricultural Crops to Pollinating Bees for the Collection of Nectar and/or Pollen*. Other crops and/or crops or crop groups that meet the subject criteria, but that are not listed here, may exist.
[2]Crop groups that use bees under contract for pollination only when they are grown for seed.