Pollinator Stewardship Council
1624 Idlewood Ave., Akron, OH 44313 www.pollinatorstewardship.org 832-727-9492

June 29, 2017

Garland Waleko
Re-evaluation Division (7508P)
Office of Pesticide Programs
Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, D.C. 20460-0001

RE: EPA-HQ-OPP-2010-0384-0092--Registration Review: Draft Human Health and/or Ecological Risk Assessment for Pyrethroid chemicals

Dear Mr. Waleko,

Please accept our comments concerning *EPA-HQ-OPP-2011-0885: Pyrethrins* as well as,

Bifenthrin EPA-HQQ-OPP-2010-0384	Gamma-Cyhalothrin EPA-HQQ-OPP-2010-0470
Cyfluthrins EPA-HQQ-OPP-2010 -0684	Imiprothrin EPA-HQQ-OPP-2011-0692
Cypermethrin EPA-HQQ-OPP-2012-0167	Lambda-Cyhalothrin EPA-HQQ-OPP-2010-0480
Cyphenothrin EPA-HQQ-OPP-2010-0842	Momfluorothrin EPA-HQQ-OPP-2015-0752
D-Phenothrin EPA-HQQ-OPP-2011-0539	Permethrin EPA-HQQ-OPP-2011-0039
Deltamethrin EPA-HQQ-OPP-2019-0637	Prallethrin EPA-HQQ-OPP-2011-1009
Esfenvalerate EPA-HQQ-OPP-2019-0301	Pyrethrins EPA-HQQ-OPP-2011-0885
Etofenprox EPA-HQQ-OPP-2017-0804	Tau-fluvalinate EPA-HQQ-OPP-2010-0915
Fenproprthrin EPA-HQQ-OPP-2010-0422	Tefluthrin EPA-HQQ-OPP-2012-0501
Flumethrin EPA-HQQ-OPP-2016-0031	Tetramethrin EPA-HQQ-OPP-2011-0907

Pollinator Stewardship Council, American Honey Producers Association, and American Beekeeping Federation only support registration of pollinator toxic pesticides when labeling includes a Bee Hazard Statement which discusses the nature of the hazard to pollinators; and the "Directions for Use" on the label prohibits ERT formulation / applications on bloom or restricts non-ERT formulations to night application when bees are not present.

Pollinator poisoning occurs from direct exposure from applications when bees are present, and whenever toxins remain present in the floral resources that pollinators are relying on for nutrition. Toxins may also be present in foraged water. Poisoning events with honey bees may result in immediate death of the colony but more often they result in weakening and diminishing the functioning of the colony. Chemical poisoning of a colony of honey bees manifests itself in many ways throughout a season, including: reproductive issues with both male and female bees, depleted field force populations, diminished cognitive capacity, and reduced immune responses which can open the door to a host of viral and pathogenic ailments, as well as exacerbating Varroa mite loads. All of these effects contribute to lower over-winter survival rates and increase colony failures throughout the year.

Pyrethrins are only slightly soluble in water but do breakdown when exposed to sunlight. Pyrethroids are the manufactured chemicals related to pyrethrins, but pyrethroids are "often more toxic to insects."[1] "Pyrethrins and pyrethroids are often combined commercially with other chemicals called synergists, which enhance the insecticidal activity of the pyrethrins and pyrethroids, . . .thus increasing their toxicity."[2] "Technical-grade (concentrated) pyrethrins and pyrethroids are usually mixed with carriers or solvents . . . that can increase the toxicity of the product when compared to the technical-grade material." [3] Pyrethrins and pyrethroids are used to control flying insects (invertebrates), but are "extremely toxic to fish." [4] However, these chemicals, which can be removed from the air by rain and snow, "can enter lakes, ponds, rivers, and streams from rainfall or runoff from agricultural fields." [5] While these chemicals are not systemic in nature, the residues from foliar applications "may be found on leaves, fruits, and vegetables." [6] These residues are an avenue of exposure to honey bees and native pollinators as they walk across blooming plants and collect the nectar and pollen. While these "compounds are eventually degraded by the microorganisms in soil and water"[7] and "by sunlight at the surfaces of water, soil, or plants"[8] this research is for the single active ingredient and does not evaluate these chemicals when they are mixed with other pesticides. "Some of the more recently developed pyrethroids can persist in the environment for a few months before they are degraded." [9]

Pyrethroid Research shows:

- These products are highly toxic to bees;
- During 2015, pyrethroids were applied to over one million acres of orchards alone [10] as well as millions of acres of soybeans, sunflowers, alfalfa, and other crops;
- The repellency aspect of pyrethroids alters foraging behavior in honey bees;
- Sub-lethal exposure to pyrethroids impacted bee behavior over a 24 hour period;
- Pyrethroid-exposed bees traveled 30-71% less than control bees;
- Esfenvalerate and permethrin decreased social interaction time between 43% and 67%;
- Permethrin exposure contributed to bees spending five times more in the food zone; [11]

- Inadequate data exists on honey bee exposure to pesticides from the use of commercial formulations, bottle mixes, and common tank mixes in experiments instead of active ingredients, with a special assessment of co-formulants (quantitative exposure and effects); [12]
- The air matrix within the colony must be explored in order to complete current knowledge on honey bee pesticide exposure;[13]
- Pyrethrins alone provide limited crop protection because they are not stable;[14]
- Pyrethrin toxicity increases with higher water temperatures and acidity; [15]
- Natural pyrethrins are contact poisons, but can be detoxified by the insect. "To delay the enzyme action so a lethal dose is assured, micro-encapsulation (zeon technology) is commonly used, this significantly alters the RT25 breakdown." [16] Microencapsulation creates RT25s measured in days, not hours. Additionally, applicators commonly add other classes of pesticides to the tank, which significantly alter the toxic profile;[17]
- Pyrethrins may be harmful for up to seven days; 11.9 hours in water, 12.9 hours on soil surfaces;
- In the absence of light, pyrethrin breaks down more slowly in water taking 14-17 days to degrade; if the water is acidic pyrethrin does not readily degrade;
- Half-lives of pyrethrin in sediment are 10.5-86 days.[18]

Research gaps:

- The half-life and the toxicity of pyrethroids in pollen in the hive in the absence of air and light;
- The half-life and the change of toxicity in pyrethroids in honey as the pH changes as honey is dried by the bees;
- Risk data to bees from pyrethroid commercial formulations with and without extenders or microencapsulation, adjuvant mixes, and common tank mixes;
- The air matrix within the colony must be documented to model pesticide movement for acute risk assessment;
- What do UV blockers do to risk assessment?

Purdue researchers released research findings of pollen samples collected from bee hives across Indiana. *"The pollen samples represented up to 30 plant families and contained residues from pesticides spanning nine chemical classes, including neonicotinoids - common corn and soybean seed treatments that are toxic to bees. The highest concentrations of pesticides in bee pollen, however, were pyrethroids, insecticides typically used to control mosquitoes and other nuisance pests."*[19] Pyrethroids are also licensed for soybeans, sunflowers, potatoes, canola, corn, rice, cotton, and many more crops. "These findings really illustrate how honey bees are chronically exposed to numerous pesticides throughout the season, making pesticides an important long-term stress factor for bees."[20]

We can protect crops and pollinators

Research published in 2015, Spray Toxicity and Risk Potential of 42 Commonly Used Formulations of Row Crop Pesticides to Adult Honey Bees, found *"Three pesticides killed less than 1% of the worker bees, including the herbicide, a miticide, and a neonicotinoid. Twenty-six* *insecticides killed more than 99% of the bees, including commonly used organophosphates and neonicotinoids. The remainder of the 13 chemicals killed from 1–99% of the bees at field application rates. This study reveals a realistic acute toxicity of 42 commonly used foliar pesticides"*[21] This research examined field realistic exposures, and implies the economic losses beekeepers regularly encounter.

Beekeepers seek safe forage for all pollinators. The Environmental Protection Agency can ensure safe forage for pollinators by:

1) Harmonizing all bee toxic pesticide labels with a standard mandatory bee hazard statement, which accurately describes the nature of the hazard to pollinators, and has a "Directions for Use" which prohibits ERT formulation /applications on bloom and restricts non-ERT formulations to night application when pollinators are not present;
2) Performing risk evaluations and toxicity testing with marketed products sold to consumers;
3) Expanding toxicology testing to include all commonly applied ingredients applied by growers/applicators;
4) Perform longitudinal hive studies on RT25 of less than eight hours, and ERT products to evaluate effects on queens when consuming pollen and honey (concentrated nectar) that have been exposed to pyrethroids;
5) Conducting a Comprehensive Exposure Assessment. Perform risk assessment at field-realistic exposures, due to wholesale pyrethroid use to which bees are exposed numerous times within a season;
6) Conducting a comprehensive (factoring the crop and environmental value of beneficial insects) cost-benefit / efficacy analysis before pesticide registrations are approved;
7) Addressing "dual labeling" for insecticides that have an RT25 greater than 8 hours;
8) Utilize academic studies in addition to manufacturer's supplied studies as part of pesticide toxicity and risk assessment;
9) Implementing a proactive model for local enforcement of pesticide laws and regulations.

Key to protecting honey bees and native pollinators is accurate risk assessment, economic assessment, and product labeling. This includes a mandatory bee hazard statement stating the nature of the hazard to bees. The "Directions for Use" must eliminate the application of Extended Residual Toxicity (ERT) formulations for specified hours / days prior to bloom until bloom is concluded.

Sincerely,

Bret Adee
President

Gene Brandi
President

Kelvin Adee
President

[1] Agency for Toxic Substances & Disease Registry, Public Health Statement for Pyrethrins & Pyrethroids, Sept. 2003, https://www.atsdr.cdc.gov/ToxProfiles/tp155-c1-b.pdf

[2] Ibid.

[3] Ibid.

[4] Ibid.

[5] Ibid.

[6] Ibid.

[7] Ibid.

[8] Ibid.

[9] Ibid.

[10] Pyrethroid Insecticides Alter Honey Bee Behavior, May 25, 2015, Entomology Today, https://entomologytoday.org/2015/05/29/pyrethroid-insecticides-alter-honey-bee-behavior/

[11] Evaluating sub-lethal effects of orchard-applied pyrethroids using video-tracking software to quantify honey bee behaviors, Article · May 2015 with 82 Reads, **D**OI: 10.1016/j.chemosphere.2015.04.022 · Source: PubMed, https://www.researchgate.net/publication/276208371_Evaluating_sub-lethal_effects_of_orchard-applied_pyrethroids_using_video-tracking_software_to_quantify_honey_bee_behaviors

[12] The exposure of honey bees (***Apis mellifera***; Hymenoptera: Apidae) to pesticides: Room for improvement in research, Johanna Benuszak, Marion Laurent, Marie-Pierre Chauzat, https://doi.org/10.1016/j.scitotenv.2017.02.062,

[13] Ibid.

[43] Extension Toxicology Network, Cornell University, 3/94, http://pmep.cce.cornell.edu/profiles/extoxnet/pyrethrins-ziram/pyrethrins-ext.html

[15] Ibid

[16] Ibid.

[17] Extension Toxicology Network, Cornell University, 3/94, http://pmep.cce.cornell.edu/profiles/extoxnet/pyrethrins-ziram/pyrethrins-ext.html

[18] Pyrethrins: General Fact Sheet, National Pesticide Information Center, http://npic.orst.edu/factsheets/pyrethrins.html#whatis

[19] Honeybees pick up host of agricultural, urban pesticides via non-crop plants, Natalie van Hoose, Purdue Agricultural News, May 31, 2016, The study was published in *Nature Communications* on Tuesday (May 31) and is available at http://dx.doi.org/10.1038/ncomms11629,

[20] Ibid.

[21] Spray Toxicity and Risk Potential of 42 Commonly Used Formulations of Row Crop Pesticides to Adult Honey Bees (Hymenoptera: Apidae)**,** Yu Cheng Zhu, John Adamczyk, Thomas Rinderer, Jianxiu Yao, Robert Danka, Randall Luttrell, and Jeff Gore, J., Econ. Entomol. 1–8 (2015); DOI: 10.1093/jee/tov269, https://academic.oup.com/jee/article/108/6/2640/2379815/Spray-Toxicity-and-Risk-Potential-of-42-Commonly

Other Resources

Pesticide Research Institute https://www.pesticideresearch.com/site/?page_id=7230

How to control mosquitoes without killing pollinators and other important wildlife, Arlington Regional Master Naturalists, https://armn.org/2016/02/19/how-to-control-mosquitoes-without-killing-pollinators-and-other-important-wildlife/