Pollinator Stewardship Council

1617 White Water Ct. Berthoud, CO 80513

www.pollinatorstewardship.org

May 3, 2020

To: US EPA Office of Pesticide Programs

From: Pollinator Stewardship Council

Re: Docket numbers EPA-HQ-OPP-2012-0329, EPA-HQ-OPP-2011-0865, EPA-HQ-OPP-2011-0920, EPA-HQ-OPP-2008-0844, and EPA-HQ-OPP-2011-0581

We are writing to comment on EPA's Proposed Interim Decision (PID) for Several Neonicotinoid Pesticides, docket numbers EPA-HQ-OPP-2012-0329 (Acetamiprid), EPA-HQ-OPP-2011-0865 (Clothianidin and Thiamethoxam), EPA-HQ-OPP-2011-0920 (Dinotefuran), EPA-HQ-OPP-2008-0844 (Imidacloprid), and EPA-HQ-OPP-2011-0581 (Thiamethoxam).

Commercial and sideline beekeepers in the U.S. provide vital pollination services nationwide and are part of the agricultural system that ensures an abundant supply of fruits, vegetables, and nuts. The economic value of pollination services in the U.S. is estimated at $20-30 billion annually. Yet since 2006, it has been a struggle to keep colonies thriving and able to do their jobs as pollinators. Where monitoring has been done, native bees are declining in abundance and diversity. The systemic neonicotinoid pesticides have been studied extensively in laboratory and field settings and found to be the source of both acute kills and multiple sub-lethal effects that point to these pesticides as one of the primary causes of the high rates of colony loss over the last 15 years.

The Registration Review process provides an opportunity for US EPA to eliminate this threat to pollinators. Unfortunately, this PID does little to reduce this threat to pollinators. The facts remain: Bloom is the sole source for both the pollen and nectar that pollinators need to survive. Persistent, systemic poisons like the neonicotinoids cannot be safely applied to blooming plants without contaminating pollinator food sources. **We urge EPA to use this review process to impose a total ban on the use of neonics for all outdoor applications, including foliar, drench and seed treatments.** By eliminating the outdoor use of neonics in the U.S., EPA would begin to align with the rest of the world in protecting pollinators and the environment. Below, we provde additional information.

1. Pollination Services Are at Risk

With the increased annual colony mortality observed over the last 10-15 years, it is becoming ever more difficult for beekeepers to meet the needs of farmers needing pollination. It is only through heroic efforts on the part of beekeepers that the nation's bee supply remains adequate. But the economic costs of keeping colonies alive and sufficient for pollination are skyrocketing. Inputs of bee feed, replacement queens, package bees, and the work required to split existing colonies to ensure there are sufficient bees for pollination is taking its toll on beekeeping, requiring major changes in operations to keep the bees alive and sending a number of beekeepers out of business. US EPA describes one of its priorities as "protecting pollination services." However, pollination services cannot be protected without protecting beekeepers' livelihood. The impacts extend to farmers as well, when pollination costs increase as a result of a reduced bee supply. If we continue on this path, pollination services provided by commercial beekeepers will be insufficient to meet the needs of agricultural production.

2. US EPA Has Failed to Consider Peer-Reviewed Science

An established body of peer reviewed science exists that defines the extent and magnitude of the damage caused by neonicotinoid insecticides to insects in general and pollinators in particular. (Potts *et al.*, 2010, Pisa *et al.*, 2017, Goulson, 2019). Publications on the science of pesticide impacts on honey bees and other pollinators is accumulating at the unprecedented rate of over 200 per year over the last five years. EPA has little information in its risk assessments to indicate they have considered the available science. To allow continued use of neonics in the current use pattern is contrary to the scientific realities. EPA's continued assertion that the risks associated with neonic use can be mitigated is contradictory to both the science and in stark contrast to the regulatory decisions based on this science that both Canada and the European Union have made. I**n order to protect pollinators and agricultural sectors that rely on pollination services, US EPA must make a comprehensive science-based decision to end the current neonic uses.**

A. Non-Acute Risks to Pollinators Have Not Been Adequately Considered

Multiple studies show that honey bee exposures to pesticides are common and that exposures change depending on the season of application, the availability of contaminated pollens and nectars, and the season in which they are consumed (Mullin, *et al.* 2010, Sanchez-Bayo, *et al.*, 2014). Exposures through pollens can last for days to weeks, as the pollen is brought into the colony and used over time, resulting in both acute and chronic exposure (Tsvetkov *et al.*, 2017).

Sublethal effects of neonicotinoids have been observed at environmentally relevant concentrations and include impairment of immune function (Sanchez-Bayo *et al.,* 2016, Grass *et al.,* 2018), reduced queen lifespan and fertility (Scholer, *et al.,* 2014, Sandrock, *et al.,* 2014(a), Dively *et al.,* 2015), decreased sperm viability in drones (Straub *et al,* 2016), interference with foraging ability (Yang *et al.,* 2008, Wright *et al,.* 2015, and Henry *et al, 2012)* and navigation (Fischer, *et al., 2014)*, reduced brood survival (Grillone *et al.,* 2017), and reduced reproductive success (Sandrock *et al.,* 2014(b) and Whitehorn *et al.,* 2012). Review articles are cited here. Hundreds of references are cited therein and must be evaluated by EPA to effectively evaluate the actual risks of using these insecticides on a wide scale.

B. Risks to Ecosystems Have Not Been Adequately Considered

Neonicotinoids harm more than pollinators. Aquatic and terrestrial insects and the birds, fish, reptiles and amphibians that depend on them for food are also affected. In 2015 (van der Sluijs *et al*, 2015) with an update in 2017 (Pisa *et al*, 2017), a group of scientists published the Worldwide Integrated Assessment (WIA) on the impact of systemic pesticides on biodiversity and ecosystems. They reviewed the scientific literature and documented the wide scale extent and impacts of neonic environmental contamination on declining pollinators, food chain disruption, and pending ecological collapse of both terrestrial and aquatic systems on a world wide scale, as evidenced by the startling studies on a reduction in invertebrate biomass (Hallmann *et al.* 2017). In 2019, several review articles described the massive insect declines that are being observed as an "insect apocalypse" that are occurring worldwide. Many species numbers are reduced beyond the point of sustainability, with pesticides a primary cause of the declines (Sanchez-Bayo and Wyckhuys, 2019; Goulson, 2019).

Each of these review articles cites hundreds of peer-reviewed scientific articles, yet US EPA references very few of them in its risk assessment. **Our regulatory decisions must be based on the weight of the scientific evidence, not just on registrant results submitted to meet a requirement.**

3. The Mitigations EPA Proposes Will Not Be Effective in Reducing Impacts

A. Label Restrictions and MP3s Do Not Protect Pollinators

EPA cannot rely on applicator education and labeling in an attempt to solve the problem. It's not working. Because bloom is the sole source for both the pollen and nectar that pollinators consume, reliance on Managed Pollinator Protection Plans (MP3s), which allegedly create 'legal' applications of poisons in and on bloom are not a legitimate mitigation measure. State MP3s make all applications of insecticide 'legal' except for the precise field under a pollination contract. Thus, states all operate under the premise that nearly all bee kills are caused by 'legal' applications, hence no violation of the label and no reason to report a poisoning incident to EPA to include in the EIIS Database. This arrangement results in EPA being blind to problems occurring in the field.

Finally, the current MP3s being developed and implemented in each State simply ask beekeepers to move or cover hives in advance of pesticide spays. This is not a viable option for commercial beekeepers with thousands of hives.

B. The Highest Use Category—Seed Treatments—Remains Unmitigated

In the PID, EPA proposes a number of reductions in neonic application rates to selected fruit, vegetable, and nut crops as mitigation measures. However, with the exception of cotton, no use reductions were imposed on commodity crops, which account for 87% of the total neonic use in 2014, the last year a reasonably complete data set was collected (USGS, 2020). Most of this use is for seed treatments. In its current incarnation, the proposed "mitigations" are minuscule, reducing use by only 4% on a small number of acres of fruits, vegetables, and nuts (see Table 1 below). The damage will continue.

Since 2015, estimates of seed treatment uses are no longer being collected (Hitaj 2020), so we lack a current picture of use. However, little has changed with the major crops, with seed treatment uses continuing. The failure to regulate this particular use will continue to result in both acute and chronic impacts on pollinators, from seed dust drift to contamination of our farmland and waterways.

Table 1: Proposed Use Reductions from PID in Neonicotinoids in Comparison to Total 2014 Use[a, b]

Crop Group	% of total neonic use, 2014	Total Kg of AI applied, 2014	Avg % change proposed by EPA	Proposed Reduction in kg
Corn	53%	1,900,612	0%	0
Soybeans	22%	791,984	0%	0
Cotton	6%	230,668	-26%	-59,974
Vegetables and fruit	6%	208,539	-15%	-31,281
Orchards and grapes	5%	189,725	-20%	-37,945
Wheat	5%	167,130	0%	0
Other crops	2%	59,022	-21%	-12,395
Rice	0%	5,486	0%	0
Alfalfa	0%	767	0%	0
Pasture hay	0%	2	0%	
Total Neonic Use in 2014		**3,553,936**	**Total Proposed Reduction in Use**	**-141,594**
Total neonicotinoid use on commodity crops in 2014		**3,096,648**	**Reduction as % of Total Use**	**-4.0%**
Use on commodity crops as % of total in 2014		**87%**		

[a]USGS, 2014 data, https://water.usgs.gov/nawqa/pnsp/usage/maps/county-level/

[b]Includes acetamiprid, clothianidin, dinotefuran, imidacloprid, and thiamethoxam.

C. Risks from Off-Target Movement of Neonicotinoids Cannot Be Mitigated

Recent studies with whole honey bee colonies by Tsvetkov *et al.* (2017) showed that when colonies were near corn crops planted from treated seed, bees were exposed to neonics in non-target pollen from field-side plants for 3-4 months, which resulted in decreased survival. Similarly, Woodcock *et al.* (2017) found that neonicotinoid exposure from non-target sources, when bees were near canola, reduced overwintering and colony reproduction in both wild bees and honey bees. A similar result was found in the UK (Budge *et al.* 2017). These field trials, with field-realistic exposure across countries with differing habitat, all show that neonics are leaching into the soils and then being picked up by non-target plants that bees visit near the agricultural fields. This idea was first demonstrated by the work of Krupke *et al.* (2017) and Botis *et al.* (2015) and, coupled with recent ground water contamination data on neonics (Hladik *et al.* 2014, Main *et al.* 2014, Raby *et al.* 2018), paint a picture of contamination and impact from the planting of treated seeds that cannot be ignored.

D. Mixtures Are Not Addressed

US EPA's required testing of active ingredient only is insufficient to determine the actual field toxicity of commonly applied cocktails of insecticides, insect growth regulators, fungicides, and adjuvants. Few neonicotinoid-containing products are applied in isolation, yet the vast majority of test data is for the isolated active ingredient. Often multiple products are applied together as tank mixes, guaranteeing exposures to multiple pesticides and adjuvants simultaneously. There are a number of patents filed by registrants touting the synergistic effects of combinations of pesticides (Donley, 2016), enhancing their

insecticidal activity. There is also a growing body of research that explores the mechanisms of synergistic interactions (Wade *et al.,* 2019, Johnson *et al.,* 2013). US EPA failed to assess these aspects of neonicotinoid use and thus underestimates the risks.

4. Conclusion

EPA has a mandate to protect the environment. Now is the time for EPA to take into account the mounting scientific evidence that shows a consistent pattern of negative effects of the neonicotinoid insecticides on pollinators at field-realistic exposures. We urge EPA to follow its own language in the PIDs which states: "*no unreasonable adverse effects.*" The risk-benefit analysis indicates that the adverse effects to pollinators and the broader environment are well documented and the benefits to farmers are insufficient to outweigh the significant risks associated with use of these insecticides. In Europe, a systematic review of neonics resulted in their use being banned (EFSA 2013a,b,c). European farmers are finding alternatives, and people are not starving due to crop failure.

More broadly, beekeepers are an essential part of agriculture, and if bees can't thrive near the land that grows our crops, we need to rethink how agriculture can be restructured to protect soils, pollinators, water quality, and humans. Prophylactic use of systemic pesticides (insecticides, fungicides, insect growth regulators) is incompatible with Integrated Pest Management and damaging to ecosystems. EPA should be preventing harm, but the PID for the neonics only perpetuates the current failures of pest management approaches over the last 50 years. **A total ban on the use of neonics in field crops is a necessary first step in protecting both the environment in which we live and pollinators whose services feed us daily.**

Prepared by: Pollinator Stewardship Council and Dr. Susan Kegley

References:

Budge et al. 2015. Evidence for pollinator cost and farming benefits of neonicotinoid seed coatings on oilseed rape. Scientific Reports. **5**: 12574.

EFSA. Conclusion on the peer review of the pesticide risk assessment for bees for the active substance thiamethoxam. EFSA J. **11**, 3066 (2013a). doi:10.2903/j.efsa.2013.3066

European Food Safety Authority (EFSA). Conclusion on the peer review of the pesticide risk assessment for bees for the active substance clothianidin. EFSA J. **11**, 3067 (2013b). doi:10.2903/j.efsa.2013.3067

EFSA. Conclusion on the peer review of the pesticide risk assessment for bees for the active substance imidacloprid. EFSA J. **11**, 3068 (2013c). doi:10.2903/j.efsa.2013.3068

Dively GP, Embrey MS, Kamel A, Hawthorne DJ, Pettis JS. 2015. Assessment of Chronic Sublethal Effects of Imidacloprid on Honey Bee Colony Health. PLoS ONE. ;10: e0118748. doi:10.1371/journal.pone.0118748

Donley N. Toxic Concoctions: How the EPA Ignores the Dangers of Pesticide Cocktails. Center for Biological Diversity; 2016 Jul p. 16. Available: https://www.biologicaldiversity.org/campaigns/pesticides_reduction/pdfs/Toxic_concoctions.pdf

Fischer J, Müller T, Spatz A-K, Greggers U, Grünewald B, Menzel R. Neonicotinoids Interfere with Specific Components of Navigation in Honeybees. Naug D, editor. PLoS ONE. 2014;9: e91364. doi:10.1371/journal.pone.0091364

Goulson, D. 2019. The insect apocalypse, and why it matters. *Current Biology*, *29* (19) 967-971.

Grass IJ, Holt S, Cremen N, Peso M, Hahne D, Baer B. 2018. Synergistic effects of pathogen and pesticide exposure on honey bee (Apis mellifera) survival and immunity, J Invertebr Pathol.; 159:78-86. doi: 10.1016/j.jip.2018.10.005

Grillone G, Laurino D, Manino A, Porporato M. Toxicity of thiametoxam on in vitro reared honey bee brood. Apidologie. 2017 [cited 24 Apr 2017]. doi:10.1007/s13592-017-0506-6Hallmann et al. 2014. Declines in insectivorous birds are associated with high neonicotinoid concentrations. Nature. 511: 341–343.

Hallmann et al. 2017. More than 75 percent decline over 27 years in total flying insect biomass in protected areas. October 18, 2017 PloS One 0185809.

Henry et al. 2012. A common pesticide decreases foraging success and survival in honey bees. Science **336**, 348–350.

Hitaj et al. 2020. Sowing Uncertainty: What We Do and Don't Know about the Planting of Pesticide-Treated Seed Bio*Science* doi.org/10.1039/biosci

Hladik et al. 2014. Widespread occurrence of neonicotinoid insecticides in streams in a high corn and soybean producing region, USA. Environmental Pollution 193: 189-196.

Johnson RM, Dahlgren L, Siegfried BD, Ellis MD. Acaricide, Fungicide and Drug Interactions in Honey Bees (Apis mellifera). PLoS ONE. 2013;8: e54092. doi:10.1371/journal.pone.0054092

Jones et al. 2014. Neonicotinoid concentrations in arable soils after seed treatment applications in preceding years. Pest Manag. Sci. **70**, 1780–1784.

Krupke et al. 2017. Planting of neonicotinoid-treated maize poses risks for honey bees and other non-target organisms over a wide area without consistent crop yield benefit. Journal of Applied Ecology 2017, 54, 1449–1458 doi: 10.1111/1365-2664.12924

Main et al. 2014. Widespread Use and Frequent Detection of Neonicotinoid Insecticides in Wetlands of Canada's Prairie Pothole Region. PLoS ONE 9(3): e92821. doi:10.1371/journal.pone.0092821

Mullin CA, Frazier M, Frazier JL, Ashcraft S, Simonds R, vanEngelsdorp D, et al. 2010. High Levels of Miticides and Agrochemicals in North American Apiaries: Implications for Honey Bee Health. F. Marion-Polled. PLoS ONE 5:e9754; doi:10.1371/journal.pone.0009754, and references cited therein.

Pisa L, Goulson D, Yang E-C, Gibbons D, Sánchez-Bayo F, Mitchell E, et al. An update of the Worldwide Integrated Assessment (WIA) on systemic insecticides. Part 2: impacts on organisms and ecosystems. Environ Sci Pollut Res Int. 2017. doi:10.1007/s11356-017-0341-3

Potts et al. 2010. Global pollinator declines: Trends, impacts and drivers. Trends Ecol. Evol. **25**, 345–353.

Raby et al. 2018. Acute toxicity of 6 neonicotinoid insecticides to freshwater invertebrates. Environmental Toxicology and Chemistry, 37(5), 1430-1445.

Rundlöf et al. 2015. Seed coating with a neonicotinoid insecticide negatively affects wild bees. Nature **521**, 77–80.

Sanchez-Bayo F, Goka K. 2014. Pesticide Residues and Bees – A Risk Assessment. R.N.C. Guedesed. PLoS ONE 9:e94482; doi:10.1371/journal.pone.0094482, and references cited therein.

Sánchez-Bayo F, Goulson D, Pennacchio F, Nazzi F, Goka K, Desneux N. 2016. Are bee diseases linked to pesticides?—a brief review.Environ Int 89–90:7–11

Sánchez-Bayo F, Wyckhuys KAG. 2019. Worldwide decline of the entomofauna: A review of its drivers. Biological Conservation. 2019;232: 8–27. doi:10.1016/j.biocon.2019.01.020

Sandrock et al. 2014(a). Sublethal neonicotinoid insecticide exposure reduces solitary bee reproductive success. Agric. For. Entomol. 16, 119–128.

Sandrock C, Tanadini M, Tanadini LG, Fauser-Misslin A, Potts SG, Neumann P. 2014(b). Impact of Chronic Neonicotinoid Exposure on Honeybee Colony Performance and Queen Supersedure. Desneux N, editor. PLoS ONE. 2014;9: e103592. doi:10.1371/journal.pone.0103592

Scholer J, Krischik V. Chronic Exposure of Imidacloprid and Clothianidin Reduce Queen Survival, Foraging, and Nectar Storing in Colonies of Bombus impatiens. Dearden PK, editor. PLoS ONE. 2014;9: e91573. doi:10.1371/journal.pone.0091573

Straub L, Villamar-Bouza L, Bruckner S, Chantawannakul P, Gauthier L, Khongphinitbunjong K, et al. 2016. Neonicotinoid insecticides can serve as inadvertent insect contraceptives. Proceedings of the Royal Society B: Biological Sciences;283: 20160506. doi:10.1098/rspb.2016.0506

Straub et al. 2015. Superorganism resilience: eusociality and susceptibility of ecosystem service providing insects to stressors. Current Opinion in Insect Science. Vol 12:109-112.

Tsvetkov et al. 2017. Chronic exposure to neonicotinoids reduces honey bee health near corn crops Science Vol. 356, Issue 6345, pp. 1395-1397.

US Geological Survey, 2020. Estimated Annual Agricultural Pesticide Use, https://water.usgs.gov/nawqa/pnsp/usage/maps/

Van der Sluijs JP, Amaral-Rogers V, Belzunces LP, Lexmond MFIJB van, Bonmatin J-M, Chagnon M, et al. Conclusions of the Worldwide Integrated Assessment on the risks of neonicotinoids and fipronil to biodiversity and ecosystem functioning. Environ Sci Pollut Res. 2014;22: 148–154. doi:10.1007/s11356-014-3229-5

Wade A, Lin C-H, Kurkul C, Regan ER, Johnson RM. Combined Toxicity of Insecticides and Fungicides Applied to California Almond Orchards to Honey Bee Larvae and Adults. Insects. 2019;10: 20. doi:10.3390/insects10010020

Whitehorn *et al.* 2012. Neonicotinoid pesticide reduces bumble bee colony growth and queen production. Science 336, 351–352.

Woodcock *et al.* 2017. Country-specific effects of neonicotinoid pesticides on honey bees and wild bees. Science Vol. 356, Issue 6345, pp. 1393-1395.