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April 20, 2018

Office of Pesticide Programs
Environmental Protection Agency
Docket Center (EPA/DC), (28221T),
1200 Pennsylvania Ave. NW.,
Washington, DC 20460-0001.

Re: Preliminary Neonicotinoid Assessments - Clothianidin EPA-HQ-OPP-2011-0865; Imidacloprid EPA-HQ-OPP-2008-0844, Thiamethoxam EPA-HQ-OPP-2011-0581; Dinotefuran EPA-HQ-OPP-2011-0920

We are writing in response to the preliminary ecological (non-pollinator) assessments for the neonicotinoids; clothianidin, thiamethoxam, dinotefuran, and the terrestrial ecological assessment for imidacloprid. Overall, the U.S. Environmental Protection Agency (EPA) identified acute and chronic risks to a number of aquatic species, birds, and mammals. The assessment findings of risks to aquatic organisms from clothianidin and thiamethoxam are similar to those determined in the 2017 imidacloprid aquatic assessment. These, coupled with exposure risks to bees warrants a revocation of the registrations of these chemicals.

Along with the risks identified in the assessments, the agency is specially requesting feedback on the benefits of continued use of the neonicotinoids in cotton and citrus crops, identified in last year's pollinator assessments as posing risks to honey bees, in developing possible mitigation options that may be needed to address risks to bees. The agency believes neonicotinoids are crucial for the management of Asian citrus psyllid, an invasive pest that causes citrus greening, and for plant bugs and stink bugs in cotton. While safeguarding our agricultural system from invasive pests is necessary in certain cropping systems, there are more environmental risks than benefit to continued use of neonicotinoids, given available alternatives.

According to EPA, "all neonicotinoid insecticides are expected to exhibit a high toxicity to aquatic invertebrates, particularly insect larvae, in part due to the mode of action."[1] Alarmingly, a little as 1 to 6 percent of a birds diet of treated seed is enough to trigger acute and chronic risks. As such, we do not support the continued use of neonicotinoid insecticides as they pose unreasonable risks to the environment, especially to non-target species that provide essential services to aquatic and terrestrial ecosystems, and agriculture.

1 USEPA. 2017. Thiamethoxam -Transmittal of the Preliminary Aquatic and Non-Pollinator Terrestrial Risk Assessment to Support Registration Review. Office of Pesticide Programs. Washington DC.

In light of the findings of these preliminary assessments, which are summarized below, EPA has determined unequivocally that neonicotinoids pose risks to the environment that cannot be mitigated in any long-term, sustainable way. The summarized findings are presented to urge the agency to take swift action and revoke the registrations for imidacloprid, clothianidin, thiamethoxam, and dinotefuran.

Clothianidin (EPA-HQ-OPP-2011-0865):

Clothianidin is one of the most widely used insecticides on agricultural lands. 42 million acres of corn are treated with clothianidin, corresponding to an estimated annual average of 45% of the total crop planted in the US.[2] For soybeans, an estimated 2.1 million acres are treated via seed coating. Clothianidin is the most persistent of the neonicotinoids, with estimated half-lives of 144 to 5,357 days in aerobic soils, and 178-180 days in aquatic aerobic environments. Additionally, it is considered to be mobile to highly mobile in soil and readily dissolves in water, leading to concerns about surface runoff from treated sites.[3]

EPA conducted aquatic and terrestrial assessments for clothianidin and found the potential for acute and chronic risks to non-target organisms, including birds.

Aquatic invertebrates: Aquatic invertebrates, especially insects, are highly sensitive to neonicotinoid exposures on both an acute and chronic basis. Adverse impacts include altered reproduction for both freshwater and marine invertebrates, and developmental impacts in benthic invertebrates after chronic exposures.

On an acute basis, the assessment found few risks from the modeled scenarios and test organisms. However, the agency notes that after using a weight of evidence approach including additional lines of evidence, e.g. using toxicity data from other aquatic invertebrates, monitoring data, and data from other neonicotinoids, the overall conclusion is that there is potential for acute risk to invertebrates.

Despite this finding, clothianidin's aquatic assessment was not based on the most sensitive aquatic species, and risks are most likely higher than anticipated. From imidacloprid's aquatic assessment, EPA found the mayfly to be the most sensitive aquatic species, but mayfly data for clothianidin is not available. However, the agency notes that clothianidin and imidacloprid share comparable toxicity as they both share similar magnitude of acute toxicity to the caddisfly –whose data was available for both chemicals. The agency notes that "while acute toxicity data with mayflies are not available, if their sensitivity to clothianidin is similar to imidacloprid, then this suggests that the acute risks to aquatic invertebrates may be underestimated."[4]

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2 USEPA. 2017. Clothianidin – Transmittal of the Preliminary Aquatic and Non-Pollinator Terrestrial Risk Assessment to Support Registration Review. Office of Pesticide Programs. Washington DC
3 Ibid
4 Ibid

For chronic exposures, benthic organisms (chironomids) were the most sensitive tested species. All modeled uses exceeded levels of concern (LOCs) for chronic exposures. LOCs for foliar and soil applications were exceeded. Clothianidin uses on rice seed and in poultry houses also exceeded freshwater LOCs. For marine invertebrates, chronic LOCs were exceeded for foliar, seed, and soil applications to certain fruit and vegetable crops, tree nuts, rice, and ornamentals.

Seed Coating and Birds: EPA classifies clothianidin as 'moderately toxic' to birds on an acute basis. Exposures to coated seed accounted for the highest exceedances for birds. Five uses (corn, soybean, lettuce, sugarbeet, cotton) were used as surrogates for other use sites (e.g., sugar beets for small vegetables), and considerations for exposure included concentration levels on seed, number and spatial distribution on seed in field, and foraging behavior.

For small and medium birds, it takes only a few ingested coated seeds for acute LOCs to be exceeded for all crops. For large birds, acute LOCs were exceeded for coated seeds of corn, sugarbeets, and lettuce. The numbers of coated seeds that need to be consumed to reach the acute LOC for small to large birds are: 5-65 for corn; 9-60 for cotton; 5-480 for sugar beet; 25 for soybean -small birds only; 4-397 for lettuce. For chronic risks, the number of seeds that need to be consumed to reach chronic LOC for small to large birds are: 1-19 for corn; 1-69 for cotton; 1-39 for sugar beet; 4-186 for soybean; 1-32 for lettuce.

Seed Coating and Mammals: There is evidence for potential chronic effects in mammals. Observed effects include increased stillbirths and delayed sexual maturation. All coated seed crops analyzed, except soybeans, resulted in acute LOC exceedances for all sizes of mammals. The number of seeds required to reach this level would be 1-19 corn seeds, 1-32 lettuce seeds, 2-39 sugar beet seeds, 3-69 cotton seeds, and 8-185 soybean seeds.

Overall, the assessment finds current clothianidin use to be a danger to aquatic and terrestrial organisms. Aquatic insects are at risk from long-term, chronic exposures, and even small numbers of clothianidin-treated seed, especially those with high application rates in the field (i.e. number of seeds) adversely impact birds and small mammals. In light of these impacts to non-target species, the agency is duty-bound to find that clothianidin poses unreasonable risks to the environment, and revoke its registration.

Thiamethoxam (EPA-HQ-OPP-2011-0581)

The greatest amount of thiamethoxam (approx. 80%) is currently used on crops: soybeans, corn, and cotton mostly as seed coating. For corn, this translates to approximately 24 million acres treated, and 13 million for soybeans. Thiamethoxam is persistent and moderately mobile in soil. Thiamethoxam's assessment identifies risk concerns for acute and chronic exposures for aquatic species, birds, and mammals from foliar, soil, and seed coating applications.

Aquatic invertebrates: Once again, aquatic insects are the most sensitive to neonicotinoids (acute toxicity values: 20-353µg/l). Like imidacloprid, the mayfly was the most sensitive to thiamethoxam, followed by *Chironomus sp*. at the acute and chronic level. Rice seed coating exceeded acute LOCs for freshwater invertebrates. Chronic LOCs were exceeded for all foliar and soil uses (except cranberries). Interestingly, EPA finds that effect levels are so often exceeded for foliar treatments (10-29 years over 30 years), that yearly variations of thiamethoxam levels in the water would not change risk potential.[5]

Seed coating- Birds and Mammals: In general, thiamethoxam is considered slightly toxic to both birds and mammals. Seed coating uses pose risks to birds and mammals based on modeled data. For birds, acute LOCs are exceeded for all crops except soybean. The number of treated seeds to reach acute LOCs for small to large birds range: 2-15 for corn, 8-50 for cotton, and 4-368 for sugarbeet. No exceedances were listed for soybean. For chronic exposures, all seed treatment uses modeled resulted in risks of concern.

For mammals, acute exposure to coated sugar beet seed poses risks to all sizes of mammals. Chronic LOCs are exceeded for all mammalian sizes consuming coated seeds, with the exception of soybean.

Dinotefuran (EPA-HQ-OPP-2011-0920)

Dinotefuran, like other neonicotinoids, is highly soluble in water and expected to be mobile in the environment. It is moderately persistent in soil (half-life: 9-113 days in aerobic soil). The assessment identified acute and chronic risks to freshwater aquatic insects and the potential for acute exposures to birds for a range of use patterns. Acute risks for freshwater invertebrates are uncertain as there were no quantitative end points available. However, the agency used a weight of evidence approach that led to the conclusion that there "is a broad range of sensitivity of aquatic invertebrates to dinotefuran, and that sensitive aquatic invertebrates may be affected."[6] A similar conclusion for chronic risks to aquatic invertebrates was found. Marine and estuarine invertebrates are more sensitive to dinotefuran than freshwater invertebrates, and benthic organisms are also expected to be affected by dinotefuran from overlying water. For birds, there were identified acute risks from soil treatment at the highest application rate.

Underestimating Aquatic Risks

Imidacloprid's 2017 aquatic assessment revealed the surrogate test species for aquatic invertebrates, the daphnid, to be insensitive to imidacloprid,[7] and thus cannot be used as a

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5 USEPA. 2017. Thiamethoxam -Transmittal of the Preliminary Aquatic and Non-Pollinator Terrestrial Risk Assessment to Support Registration Review. Office of Pesticide Programs. Washington DC

6 USEPA. 2017. Preliminary Ecological Risk Assessment (excluding terrestrial invertebrates) for the Registration Review of Dinotefuran. Office of Pesticide Programs. Washington DC

7 USEPA. 2017. Preliminary Aquatic Risk Assessment to Support the Registration Review of Imidacloprid. Office of Chemical Safety and Pollution Prevention. Washington DC.

protective surrogate species with regard to neonicotinoid toxicity. Imidacloprid's assessment also finds that the mayfly is the most sensitive aquatic insect, several orders of magnitude more sensitive than the daphnid. It was therefore suggested by Beyond Pesticides and others that continued use of the daphnid to test the aquatic toxicity of neonicotinoids would result in risk conclusions that are not protective of more sensitive species. Standard toxicity tests must be based on aquatic species that are the most vulnerable to neonicotinoid exposures, like the mayfly, so as to not underestimate aquatic risks.

However, for clothianidin and dinotefuran toxicity data for mayflies were unavailable. This presents an uncertainty in the assessment. For imidacloprid and thiamethoxam toxicity values for the mayfly were the lowest of all species evaluated, demonstrating its sensitivity. EPA notes that when compared, imidacloprid's toxicity value for the mayfly is 29 times lower than the toxicity values for other species for clothianidin, and 2.5 times lower than the overall lowest toxicity value for clothianidin of any species.[8]

In these assessments, EPA compared toxicity endpoints from registrant data, other regulatory bodies, and the open literature to find that these neonicotinoids have the potential to result in acute and chronic effects. Given the high sensitivity of the mayfly to neonicotinoids, acute risks to aquatic invertebrates may be underestimated for clothianidin and dinotefuran, which the agency acknowledges.

Environmental Concentrations Pose Risks

Several independent sources have reported environmental concentrations of neonicotinoids in waterways. Not surprisingly, these concentrations are higher in agricultural regions where neonicotinoids are routinely applied. In the most recent study published by U.S. Geological Survey (USGS) researchers, neonicotinoids are frequently detected in tributaries around the Great Lakes.[9] In this study, detections of clothianidin and thiamethoxam are significantly correlated with the percentage of agricultural land use, increasing in the spring and summer months when the planting of coated seeds and broadcast applications are the highest. For clothianidin, maximum concentration detected was 0.225 µg/l, thiamethoxam 0.0748 µg/l, and imidacloprid 0.103µg/l. Morrissey et al., (2015) reports clothianidin levels ranging 0.003 to 3.1 µg/l, 0.001 to 225 µg/L for thiamethoxam, and 0.001 to 320 µg/l for imidacloprid in their survey of water monitoring studies.[10] In Midwest sites, where neonicotinoids are widely used, especially as seed coating, concentrations of clothianidin have been reported to range from 0.025 to 0.132 µg/L, 0.02 to 0.073 µg/l for thiamethoxam, and 0.004 to 0.026 µg/L for imidacloprid.[11]

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8 USEPA. 2017. Clothianidin – Transmittal of the Preliminary Aquatic and Non-Pollinator Terrestrial Risk Assessment to Support Registration Review. Office of Pesticide Programs. Washington DC.
9 Hladik, M, Corsi, S, Kolpin, D, et al. 2018. Year-round presence of neonicotinoid insecticides in tributaries to the Great Lakes, USA. Environmental Pollution. https://doi.org/10.1016/j.envpol.2018.01.013
10 Morrissey, C. A., Mineau, P, Devries, J, et al. 2015. Neonicotinoid contamination of global surface waters and associated risk to aquatic invertebrates: A review. Environment International. 74 (2015) 291–303.
11 Hladik, M.L. and Kolpin, D.W., 2016, First national-scale reconnaissance of neonicotinoid insecticides in streams across the U.S.A., Environ. Chem., v. 13, pp. 12-20.

In EPA's clothianidin assessment, surface water levels were reported at 1.3µg/l (1.6µg/l ground water) which were similar to the lowest acute toxicity value for aquatic invertebrates (1.85 µg/l). Monitoring data for thiamethoxam (estimated environmental concentrations (EECs) range 0.14 to 5.8µg/l) exceed chronic toxicity points for aquatic insects confirming that "environmentally relevant concentrations of thiamethoxam could be sufficient to result in growth impacts to aquatic insects." (Note for thiamethoxam, the chronic toxicity value for the mayfly is 0.43µg/l). Additionally, EPA has noted that even yearly fluctuations in thiamethoxam's concentrations would not change potential risks since thiamethoxam is so frequently detected at levels that exceed chronic risks. Reported surface water concentrations for dinotefuran range 1.9 to 11.7µg/l and the lowest toxicity value (caddisfly) is 0.0104 µg/l.

EPA notes that real-world levels are lower than the agency's modeled data, saying that "the monitoring data may not have been targeted specifically in [neonicotinoid] use areas or during times of known [neonicotinoid] use, and as such may not reflect potential peak [neonicotinoid] concentrations that may occur in surface waters when runoff events occur shortly after application."

Given real-world variability and high estimated levels, persistent neonicotinoid presence in surface waters pose risks to the most sensitive organisms when current environmental concentrations are compared to aquatic toxicity values. Coincidentally, these sensitive organisms are keystone species for aquatic ecosystems. EPA acknowledges these systems are potentially at risk due to the, "wide geographic distribution of potential…application sites," and that systems at risk include waterbodies adjacent to treatment areas, including lakes and wetlands; impounded water bodies such as reservoirs; and flowing waterways like streams and rivers, as well as marine ecosystems, including estuaries and salt marshes.

EPA's Canadian counterpart, Pest Management Regulatory Agency (PMRA), in its reevaluation of imidacloprid, notes that further mitigation of risks would be unrealistic, unsustainable, and inadequate to protect sensitive aquatic species.[12] Current neonicotinoid uses are not sustainable, and knowing the environmental burden they pose to aquatic systems, uses that pose risks to these systems must be cancelled.

Imidacloprid Terrestrial Assessment [EPA-HQ-OPP-2008-0844]

Imidacloprid's terrestrial assessment focuses on potential risks to birds, mammals, reptiles, and terrestrial-phase amphibian, as well as plants. The main sources of exposure for these organisms include diet and exposure from direct application and spray drift. Exposure from oral exposures to contaminated water and soil was not considered in this assessment as a result of a lack of standardized methods for assessing these risks.

12 PMRA. 2016. Proposed Re-evaluation Decision PRVD2016-20, Imidacloprid. Health Canada. Ottawa, Ontario.

According to EPA, 56 percent of all imidacloprid applications are as seed coating, with the remaining uses foliar and soil applications. However, for this assessment, EPA was only able to assess the uses of six seed coating uses: soybeans, wheat, cotton, corn, potato, and sorghum. Of these, soybeans account for 36 percent of total annual poundage of imidacloprid applied.[13]

Like the other neonicotinoids, imidacloprid is highly water soluble and persistent in terrestrial and aquatic environments, and poses potential risks to birds and mammals, especially from seed treatment. Imidacloprid is already classified as highly toxic to birds on an acute oral basis, and chronic toxicity results in effects on egg production, egg hatchability, and body weight. EPA's overall risk conclusion states, "For the registered agricultural and non-agricultural foliar spray applications, there is a potential for acute risk above the level of concern (LOC) to non-listed birds for all uses modeled when evaluated on an acute, oral basis." For mammals, "a potential for chronic risks is identified when evaluated on an oral basis."[14]

Birds: When it comes to seed coatings, birds are at risk from acute and chronic exposures. The agency finds that just 1-6 percent of a bird's diet of coated seed would trigger acute risk concerns (except potato) for all bird sizes. Here, cotton seeds pose the greatest risk as they contain the highest estimated concentration of imidacloprid on seeds, and have a high application rate. Chronic risks were also noted for all bird sizes, with cotton posing the highest risks, followed by corn and sorghum.

Small and medium birds are at risk from acute exposures to soil and foliar applications of all crop scenarios assessed. For small and medium insectivorous birds, acute LOCs are exceeded for foliar applications. For large herbivorous birds consuming short grasses, acute exceedances were noted (foliar).

These concerns for birds complement a recent study that finds wild songbirds consuming the equivalent of just four imidacloprid-coated canola seeds could suffer impaired condition, migration delays, and improper migratory direction which could lead to increased risk of mortality or lost breeding opportunity.[15] Symptoms of acute poisoning observed only in imidacloprid-dosed birds include loss of appetite, excess saliva, and death. The study notes that birds that use agricultural regions for forage during migration may be particularly susceptible to exposure to these insecticides.

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13 USEPA. 2017. Imidacloprid -Transmittal of the Preliminary Terrestrial Risk Assessment to Support the Registration Review

14 Ibid

15Eng, M, Stutchbury, BJM, Morrissey, C. 2017. Imidacloprid and chlorpyrifos insecticides impair migratory ability in a seed-eating songbird. Scientific Reports7: 15176. DOI:10.1038/s41598-017-15446-x

Mammals: Cotton, corn, and sorghum coated seeds pose acute risks to small mammals but not soybean and wheat seeds. All seed treatment (except potato) present chronic risks for all mammalian sizes. Once again, coated cotton seeds pose the greatest risks to mammals.

Foliar application also poses chronic risks to both small and medium mammals. A few soil applications scenarios –those with the highest application rates (bulk vegetables, citrus, tree nuts) — present chronic concerns. Approximately 33 to 100 percent of a mammal's diet as coated seed is found to trigger acute risks concerns.

Uncertainties in the Risk Assessments

For aquatic assessments, surface water monitoring concentrations were lower than those modeled by EPA. This is attributed to monitoring occurring at sites not necessarily in neonicotinoid use areas, or not taken at peak neonicotinoid use (e.g., runoff after application), so that real neonicotinoid concentrations in surface waters may be underestimated. Additionally, sampling frequency (infrequency) can also miss peak neonicotinod levels, adding to uncertainty.

EPA makes the assumption that seed depth (> 2 cm) influences levels in runoff. That is, at depths greater than 2 cm, residues are not extracted into surface runoff. However, actual planting depth may be greater or less than the assumed depth of 2 cm, presenting uncertainty in field runoff concentrations. Further, terrestrial wildlife exposure to contaminated drinking water is not quantified due to limitations in standardized procedures (i.e., drinking water is not currently an assessed exposure route for wildlife).

Since most of the exposures assessed involve consumption of coated seeds, EPA identifies uncertainties which lie in the palatability of these seeds, dietary makeup, and seed availability. EPA believes that incorporating seeds into the soil could reduce consumption and exposure by birds and mammals. However, predicting this is unreliable and methods to assess this assumption are unavailable. Further, the agency notes that birds may probe soil in search of food, so incorporation of seeds may not reduce seed availability or subsequent exposure.

Even with these uncertainties which potentially underestimate risks, the assessments found significant risks to aquatic and terrestrial species, including severe risks to birds from coated seeds. EPA notes that even with a lack of certain data, the risk assessment's conclusions –at least for aquatic invertebrates— are unlikely to be altered. The agency must therefore conclude that continued use of the neonicotinoids, clothianidin, thiamethoxam, imidacloprid and dinotefuran pose unreasonable risks to the environment.

Alternatives to Neonicotinoid Use in Citrus and Cotton

EPA is requesting feedback on the benefits of continued use of the neonicotinoids in cotton and citrus crops. Thus far, the assessments for this class of chemicals finds cotton and citrus to be the crops with the potential to pose the most risks to non-target species, including honey bees. Despite this, EPA is focusing on potential harms to the citrus and cotton industry should the use of neonicotinoids be removed instead of the harms to ecosystem function, long-term impacts to other cropping systems that depend on pollinators, and overall reduction in biodiversity and ecosystem services should honeybees and other non-target organisms most at risk be eliminated from the U.S. landscape.

EPA estimates that in citrus there would be an impact of approximately 11 percent of net operating revenue per acre of citrus, with costs varying across states like Florida and California.[16] Of concern is the impact of an increase in the Asian citrus psyllid (ACP) and the spread of the bacterial disease spread by this species, and the frequency and costs of having to replace infected trees, which are seen as unsustainable. For cotton, EPA estimates increased costs of 2.3 percent without the use of neonicotinoids, impacting about 1.2 million acres of cotton, mainly in the southern states.[17] For both cotton and citrus, EPA concludes that neonicotinoids are critical for production.

The agency did not consider the threat of increasing neonicotinoid resistance in the ACP, and economic and environmental costs of retreating to more toxic chemical alternatives to combat resistance. Already, varying levels of insecticide susceptibility exist in ACP populations across the citrus-growing areas of Florida,[18] and several insecticides have been found to be less effective against ACP including neonicotinoids, malathion, and chlorpyrifos.[19,20] In cotton, key pests are developing resistance after a few years of rotation, where approximately 57 and 65 percent of pests showed resistance to neonicotinoids, especially imidacloprid and thiamethoxam.[21] Resistant populations have also been identified for other classes of insecticides.[22] These incidences illustrate the need for more sustainable tools and a more integrated and biologically relevant management approach.[23]

Biological control methods, instead of a reliance on chemical management, have been suggested by Monzo and Stansly (2017). They note that ACP mortality attributed to biological controls (predators or parasitoids) was not sufficient to completely control pest populations under present circumstances, but "natural enemy assemblages can significantly reduce ACP numbers during the growing season," directly translating to less frequent insecticide use and

16 USEPA. 2017. Benefits of Neonicotinoid Insecticide Use in the Pre-Bloom and Bloom Periods of Citrus. BEAD. Washington DC.
17 USEPA. 2017. Benefits of Neonicotinoid Insecticide Use in the Pre-Bloom and Bloom Periods of Cotton. BEAD. Washington DC.
18 Tiwari, S, Mann, RS, Rogers, ME, Stelinski, LL. 2011.Insecticide resistance in field populations of Asian citrus psyllid in Florida. Pest Manag Sci. 67(10):1258-68.
19 Pardo, S, Martinez, AM, Figueroa, J, et al. 2018. Insecticide resistance of adults and nymphs of Asian citrus psyllid populations from Apatzingán Valley, Mexico. Pest Manag Sci. 74(1):135-140.
20 Tiwari, S, Mann, RS, Rogers, ME, Stelinski, LL. 2011.Insecticide resistance in field populations of Asian citrus psyllid in Florida. Pest Manag Sci. 67(10):1258-68.
21 Furlan, L., Pozzebon, A., Duso, C. et al. 2018. Environ Sci Pollut Res. https://doi.org/10.1007/s11356-017-10525
22 Kanga, LH, Eason, J et al. 2016. Monitoring for Insecticide Resistance in Asian Citrus Psyllid (Hemiptera: Psyllidae) Populations in Florida. J Econ Entomol. 109(2):832-6.
23 Grafton-Cardwell, EE, Stelinski, L and Stansly, PA. 2013. Biology and management of Asian citrus psyllid, vector of the huanglongbing pathogens. Annu Rev Entomol. 58:413-32.

consequently higher profits. [24] Less frequent insecticide use can in turn increase populations of predators and parasitoids.

Currently there are biological methods that have been recognized as effective against ACP. Work by the scientists at the University of Florida have identified predaceous pests: lady beetles *Olla v-nigrum, Curinus coeruleus, Harmonia axyridis* and *Cycloneda sanguinea* that have been able to reduce ACP populations by 5-27 fold. Others like ladybeetles: *Hippodamia convergens* and *Adalia bipunctata;* lacewings; the predaceous mite *Amblyseius swirskii*; and the parasitic wasp, *Tamarixia radiate* can be used to suppress ACP populations and reduce the reliance on neonicotinoids.[25] Of course, these natural predators are themselves susceptible to neonicotinoids and can only be effective in a neonicotinoid-free environment.

In addition to biological control options there are least-toxic commercial pesticides that provide chemical control alternatives that should be considered. These include several OMRI-approved products that have been found to have high effectiveness (upwards of 97 percent mortality) against ACP.[26] These products contain active ingredients (neem extract, potassium fatty acids, etc.) that, under field conditions, have resulted in significant reductions in ACP nymphs and adults, and are not deleterious to natural predators or pollinators.[27] According to Monzo at al., (2014) growth rates of the ACP populations were greatest where natural enemies had been adversely affected by insecticides,[28] and so it is important to preserve these natural predators in groves where ACP is present. Neonicotinoids will not provide long-term sustainable management of ACP, given the growing threat of resistance. We suggest the agency amend its benefits analysis to reflect the viable, least-toxic alternatives available to citrus growers.

According to the recent 2018 report by the Task Force on Systemic Pesticides (Worldwide Integrated Assessment) use of neonicotinoids "does not guarantee an increase of yield of the crops they are protecting, particularly in pollinated crops," and the use of neonicotinoids is "limited by the rapid development of resistance in target pests."[29] Instead, the team of scientists recommends a "multi-faceted" use of sustainable methods of IPM be employed. Overall, continuing on this trajectory of widespread and prophylactic use of neonicotinoids increases the risk of environmental harm and threatens important ecosystem functions and services –such as those provided by pollinators— that are essential for

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24 Monzo, C and Stansly, PA. 2017. Economic injury levels for Asian citrus psyllid control in process oranges from mature trees with high incidence of huanglongbing. PLoS One. 12(4):e0175333.
25 Qureshi, J, Khan, AA, Jones, M, Stansly, PA. Management of Asian citrus psyllid in organic citrus groves. Citrus Industry (February 2013) Available at http://www.crec.ifas.ufl.edu/extension/trade_journals/2013/2013_february_organic_groves.pdf
26 Ibid
27 Ibid
28 Monzo, C, Qureshi, JA, Stansly, PA. 2014. Insecticide sprays, natural enemy assemblages and predation on Asian citrus psyllid, Diaphorina citri (Hemiptera: Psyllidae). Bull Entomol Res. 104(5):576-85.
29 Furlan, L., Pozzebon, A., Duso, C. et al. 2018. Environ Sci Pollut Res. https://doi.org/10.1007/s11356-017-10525

supporting continued food security.[30] As such, shifting from a reliance on prophylactic insecticides like neonicotinoids to more sustainable and traditional IPM systems that utilize cultural and biological controls and practices is necessary.

Conclusion

EPA's non-pollinator assessments confirm that harms to non-target organisms and systems from neonicotinoid exposures are overarching. The agency identifies risks to aquatic insects, birds, and small mammals, coupled with significant harms to honey bees and other native bees. The risks from continued use of neonicotinoids far outweigh their perceived benefits. Recent reports of declines in bird populations,[31] reports of the pervasiveness of these chemicals in the Great Lakes,[32] and the loss of natural pollination services for all pollinator reliant crops underscore the imminent danger faced by the natural world. Further, the threat of growing insect resistance places cropping systems further at risk. Continued use of neonicotinoids presents more risk than benefit. There is no place for neonicotinoids in the environment, and based on the risks identified by the agency's own assessment we urge the revocation of this class of chemicals.

Respectfully,

Nichelle Harriott
Science and Regulatory Director

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30 Furlan, L and Kreutzweiser, D. 2015. Alternatives to neonicotinoid insecticides for pest control: case studies in agriculture and forestry. Environ Sci and Pollu Res. 22(1):135–147.
31 'Catastrophe' as France's bird population collapses due to pesticides. (Tue 20 Mar 2018) Agence France-Presse. The Guardian. https://www.theguardian.com/world/2018/mar/21/catastrophe-as-frances-bird-population-collapses-due-to-pesticides
32 Hladik, M, Corsi, S, Kolpin, D, et al. 2018. Year-round presence of neonicotinoid insecticides in tributaries to the Great Lakes, USA. Environmental Pollution. https://doi.org/10.1016/j.envpol.2018.01.013.