Overview and Discussion Points for Neonicotinoid PIDs

This document is intended to provide stakeholders an overview of mitigations proposed in the Proposed Interim Decisions (PIDs) recently released for clothianidin, dinotefuran, imidacloprid and thiamethoxam. The information used by EPA to evaluate the benefits and risks of these uses can be found in the docket links below.

For active specific questions, contact the appropriate registrant:

Clothianidin: Burleson Smith, BASF (seed treatment) 919-433-7052 or
Jeff Smith, Valent (seed treatment, soil, foliar) 602-999-1184
Imidacloprid: Frank Wong, Bayer (all uses) 703-362-5966
Thiamethoxam: Andrew Lauver, Syngenta (all uses) 712-887-1727
Dinotefuran: Tim Joseph, Landis International on behalf of Mitsui (all uses) 229-548-2809

Active Ingredient (a.i.) & Docket Number (Link to Comment)	Planned Completion	Open Dockets for Comment and Review (Closing on May 4, 2020, unless extended)
Imidacloprid EPA-HQ-OPP-2008-0844	2020	• Proposed Interim Decision for Imidacloprid • Final Bee Risk Assessment for Imidacloprid • Primary Contact: Matthew Khan, khan.matthew@epa.gov, 703-347-8613
Clothianidin EPA-HQ-OPP-2011-0865	2020	• Proposed Interim Decision for Clothianidin • Final Bee Risk Assessment for Clothianidin • Primary Contact: Matthew Khan, khan.matthew@epa.gov, 703-347-8613
Thiamethoxam EPA-HQ-OPP-2011-0581	2020	• Proposed Interim Decision for Thiamethoxam • Final Bee Risk Assessment for Thiamethoxam • Primary Contact: Matthew Khan, khan.matthew@epa.gov, 703-347-8613
Dinotefuran EPA-HQ-OPP-2011-0920	2020	• Proposed Interim Decision for Dinotefuran • Final Bee Risk Assessment for Dinotefuran • Primary Contact: Matthew Khan, khan.matthew@epa.gov, 703-347-8613

Mitigation Summary

EPA mitigations for each active ingredient were primarily focused on reducing risks to pollinators and aquatic invertebrates, although some were based on occupational risks to handlers and applicators. Other risks around mammals and avian species were addressed through stewardship activities.

EPA should be applauded for strongly considering benefits when proposing mitigations. Examples of where benefits exceed the risks are citrus and certain fruit and vegetable crops where additional mitigations were limited or absent. However, in some cases such as cucurbits, fruiting vegetables, tree fruit and nut crops, additional restrictions were proposed.

EPA also determined that risks were low for seed treatment uses while confirming their benefits.

Mitigations generally fell into the following categories: 1) additional PPE requirements; 2) use cancellations; 3) reductions in seasonal applications rates; 4) changes in application timings; 5) crop growth stage restrictions; and 6) language to reduce spray drift and runoff.

Additional PPE Requirements

- EPA is proposing a respirator and gloves requirement for certain uses of clothianidin and thiamethoxam including corn seed treatment. EPA is also proposing that thiamethoxam treatment of corn seed only be performed in a closed system.
- These additional PPE requirements are a result of risks to occupational handlers based on overly conservative exposure scenarios. Registrants are reviewing these proposals and will dispute calculations used by EPA for rate and seed size. Contact the appropriate registrant or Jane DeMarchi at ASTA for more information.

Cancellations

- EPA proposed the cancellation of some use patterns of clothianidin, dinotefuran and imidacloprid on bulb vegetables due to concerns around aquatic invertebrates. This did not apply to bulb vegetable seed treatments.
- EPA proposed the cancellation of residential spray applications to turf for imidacloprid due to human exposure concerns, and on-farm seed treatment uses for canola, millet and wheat based on occupational exposure risks. These potential risks are based on overly conservative exposure scenarios. Registrants are reviewing these proposals and will propose arguments based on generated data. Contact the appropriate registrant for more information.

Reductions in Application Rates

- One of EPA's approaches to mitigating risks to pollinators and aquatic invertebrates was to reduce total amount of active ingredient available per acre per year regardless of application method.
- Under these proposals, fewer total soil and foliar applications would be available for each neonicotinoid. For some crops, these reductions would have minimal impact but for others it would be more significant.
- Two examples of proposed mitigations on specific crops include: 1) for cotton the number of foliar applications at the highest rates would be reduced for dinotefuran and thiamethoxam, and imidacloprid would be limited to either foliar or soil applied; and 2) the proposed annual application rate for soil applications for dinotefuran to ornamentals is lower than the current single application rate.
- Since these restrictions are based upon maximum lbs of active ingredient per acre per *year*; they may adversely impact industries where multiple crops are grown per year on the same site. In this case, the restriction would not account for the need of applications across multiple crop growing seasons.
- Negative impacts of proposed maximum yearly rates on specific crop systems need to be communicated to EPA.
- Foliar Insect Resistance Management (IRM) programs in most crops are dependent on a limited number of effective Modes of Action (MOA) (primarily pyrethroids and organophosphates). Reducing the number of neonicotinoid applications and/or rate per application could lead to resistance to the remaining chemical classes by limiting a viable MOA from season-long rotational programs.
- In several benefits assessments, EPA points to the availability of products such as pyrethroids and organophosphates as alternatives to neonicotinoids. However, those chemical classes are also under registration review and should not be considered confidently as viable alternatives, as they are subject to future restrictions similar to the neonicotinoids.
- Compared to alternative chemistries available for foliar applications, neonicotinoids are more selective, preserving the presence of beneficial insects which are a key component of

IPM programs.

- Neonicotinoids are very effective on sucking insect pests such as Asian citrus psyllid and aphids which are disease vectors with a very low economic threshold level. Neonicotinoids would be replaced with older, less selective products that would impact beneficial insects, reduced yields and more frequent and costly insecticide applications.
- Please view www.GrowingMatters.org for additional information including fact sheets, infographics and reports about the benefits of neonicotinoids

Proposed Maximum Annual Application Rates for Clothianidin

Crop/Crop Group	Current Rate (Max. Annual)	Proposed Rate (Max. Annual)
Berries and small fruit (excluding grape and strawberry)	Maximum combined annual application rate, regardless of formulation type: 0.20 lbs. a.i./A per year	Maximum combined annual application rate, regardless of formulation type: 0.16 lbs. a.i./A per year
Cotton	Maximum combined annual application rate, regardless of formulation type: 0.20 lbs. a.i./A per year	Maximum combined annual application rate, regardless of formulation type: 0.15 lbs. a.i./A per year
Fruiting Vegetables	Foliar: 0.20 lbs. a.i./A per year	Foliar: 0.17 lbs. a.i./A per year
Pome Fruit	Foliar: 0.20 lbs. a.i./A per year	Foliar: 0.16 lbs. a.i./A per year
Production/Commercial Ornamentals	Foliar and soil: 0.40 lbs. a.i./A per year	Foliar and soil: 0.30 lbs. a.i./A per year
Tree Nuts	Foliar: 0.20 lbs. a.i./A per year Soil: 0.40 lbs. a.i./A per year	Foliar: 0.16 lbs. a.i./A per year Soil: 0.38 lbs. a.i./A per year
Turf	Foliar: 0.40 lbs. a.i./A per year	Foliar: 0.30 lbs. a.i./A per year

Proposed Maximum Annual Application Rates for Thiamethoxam

Crop/Crop Group	Current Rate (Max. Annual)	Proposed Rate (Max. Annual)
Berries and Small Fruit (Foliar Applications)	Bushberry Subgroup (including but not limited to highbush blueberry, gooseberry, etc.)	
	0.188 lbs. a.i./A per year	0.15 lbs. a.i./A per year
	Caneberry Subgroup (including but not limited to blackberry, raspberry, etc.)	
	0.094 lbs. a.i./A per year	0.07 lbs. a.i./A per year
	Low Growing Berry Subgroup (including but not limited to lowbush blueberry, strawberry, cranberry, etc.)	
	0.188 lbs. a.i./A per year	0.15 lbs. a.i./A per year
	Small Fruit Vine Climbing Subgroup (including but not limited to maypop; excluding grape, fuzzy kiwi fruit and gooseberry)	
	0.109 lbs. a.i./A per year	0.09 lbs. a.i./A per year
Berries and Small Fruit (Soil Applications)	Bushberry Subgroup (including but not limited to highbush blueberry, gooseberry, etc.)	
	0.188 lbs. a.i./A per year	0.15 lbs. a.i./A per year
	Low Growing Berry Subgroup (including but not limited to lowbush blueberry, strawberry, cranberry, etc.)	
	0.188 lbs. a.i./A per year	0.15 lbs. a.i./A per year
	Small Fruit Vine Climbing Subgroup (including but not limited to maypop; excluding grape, fuzzy kiwi fruit and gooseberry)	
	0.266 lbs. a.i./A per year	0.22 lbs. a.i./A per year
Cotton	Maximum combined annual application rate, regardless of formulation type: 0.125 lbs. a.i./A per year	Maximum combined annual application rate, regardless of formulation type: 0.09 lbs. a.i./A per year

Proposed Maximum Annual Application Rates for Imidacloprid

Crop/Crop Group	Current Rate (Max. Annual)	Proposed Rate (Max. Annual)
Berries and small fruits (non-grapes)	Foliar and soil 0.50 lbs. a.i./A per year	Maximum combined annual application rate for any berries regardless of formulation type should not exceed 0.40 lbs. a.i./A per year
Brassica/Cole	Foliar: 0.23 lbs. a.i./A per year	Foliar: 0.20 lbs. a.i./A per year
Leafy Vegetables	Foliar: 0.23 lbs. a.i./A per year	Foliar: 0.20 lbs. a.i./A per year
Root and tuber (not including potato)	Foliar: 0.12 lbs. a.i./A per year Soil: 0.38 lbs. a.i./A per year	Foliar: 0.10 lbs. a.i./A per year Soil: 0.31 lbs. a.i./A per year
Legumes (not including peanuts or soybean)	Foliar: 0.13 lbs. a.i./A per year	Foliar: 0.11 lbs. a.i./A per year
Peanuts	Foliar: 0.13 lbs. a.i./A per year	Foliar: 0.12 lbs. a.i./A per year
Stone Fruit	Foliar: 0.50 lbs. a.i./A per year Soil: 0.38 lbs. a.i./A per year	Foliar: 0.40 lbs. a.i./A per year Soil: 0.34 lbs. a.i./A per year
Cotton	Maximum combined annual application rate, regardless of formulation type: 0.50 lbs. a.i./A per year	Maximum combined annual application rate, regardless of formulation type: 0.37 lbs. a.i./A per year
Fruiting Vegetables	Foliar: 0.23 lbs. a.i./A per year	Foliar: 0.20 lbs. a.i./A per year
Pome Fruit	Foliar: 0.50 lbs. a.i./A per year	Foliar: 0.40 lbs. a.i./A per year
Production/Commercial Ornamentals	Soil and Foliar: 0.40 lbs. a.i./A per year	Soil and Foliar: 0.30 lbs. a.i./A per year
Tree Nuts	Foliar: 0.36 lbs. a.i./A per year Soil: 0.50 lbs. a.i./A per year	Foliar: 0.30 lbs. a.i./A per year Soil: 0.36 lbs. a.i./A per year
Turf	Soil and Foliar: 0.40 lbs. a.i./A per year	Soil and Foliar: 0.30 lbs. a.i./A per year

Proposed Maximum Annual Application Rates for Dinotefuran

Crop/Crop Group	Current Rate (Max. Annual)	Proposed Rate (Max. Annual)
Cotton	Maximum combined annual application rate, regardless of formulation type: 0.268 lbs. a.i./A per year	Maximum combined annual application rate, regardless of formulation type: 0.19 lbs. a.i./A per year
Fruiting Vegetables	Foliar: 0.268 lbs. a.i./A per year	Foliar: 0.23 lbs. a.i./A per year
Brassica/Cole	Foliar: 0.268 lbs. a.i./A per year	Foliar: 0.23 lbs. a.i./A per year
Leafy Vegetables	Foliar: 0.268 lbs. a.i./A per year	Foliar: 0.23 lbs. a.i./A per year
Production/Commercial Ornamentals	Foliar and soil: 0.54 lbs. a.i./A per year	Foliar and soil: 0.40 lbs. a.i./A per year

Crop Growth Stage Restrictions

- As part of registration review, the neonicotinoid registrants were required to generate crop specific data to determine residues in pollen and/or nectar over time following field applications. EPA used these data to generate a Bee Risk Assessment in order to determine if crop growth stage restrictions were appropriate for certain crops in order to reduce exposure to pollinators. These were active ingredient specific based on residue data.
- The crop/crop group specific growth stage restrictions essentially prohibit applications of neonicotinoids during pre-bloom and bloom periods for certain crops. Primary crop/crop groups impacted include cucurbits, fruiting vegetables, tree fruit and nut crops.
- For crops with determinate bloom, foliar applications would still be viable for certain periods prior to pre-bloom as well as post-bloom. For crops with indeterminate bloom, restrictions would be more severe as soil and/or foliar applications would be prohibited from first bloom

through harvest. The exceptions were cotton and strawberries, where no growth stage restrictions were proposed.

- Under the proposed growth stage restrictions, soil and foliar applications of at least one neonicotinoid would still be allowed in all labeled crops. However, restrictions are more severe in some crops/crop groups.
    - **Cucurbits:**
        - EPA is recommending a growth stage restriction from vining (first true leaf) to harvest for soil and foliar applications of clothianidin and imidacloprid; and foliar applications of thiamethoxam.
        - The growth stage restriction is not recommended for dinotefuran, likely based on residue data and strong documentation of benefits.
        - For seeded cucurbits, at least one soil applications for each neonicotinoid would be allowed while the only neonicotinoid that could be applied foliar would be dinotefuran.
        - For transplanted cucurbits, only soil applications of dinotefuran and thiamethoxam followed by foliar applications of dinotefuran would be allowed since plants will likely have a true leaf when transplanted. Therefore, this growth stage proposal would essentially remove imidacloprid and clothianidin as options for transplanted cucurbits.
    - **Fruiting Vegetables:**
        - EPA's Final Bee Risk Assessment states that honey bees are not attracted to fruiting vegetables. However, in Section 1.3 the EPA states "many of the fruiting vegetables are not attractive to honey bees but are attractive other species of bees (e.g., *Bombus* spp). Therefore, additional crops in the fruiting vegetables group that were considered low risk to honey bees may pose a risk to non-Apis bees". EPA used risk to non-Apis bees to propose significant restrictions to fruiting vegetables.
        - For tomato, pepper, chili pepper and okra, all soil applications of neonicotinoids could only be applied up to 5 days after planting or transplanting. Foliar applications would be prohibited from the appearance of the initial flower buds to when flowering is complete (essentially till harvest for indeterminate crops). This would limit the effective control of pepper weevil.
        - For all other fruiting vegetables, EPA is proposing that applications are prohibited from the appearance of the initial flower buds to when flowering is complete. Therefore, all foliar applications to fruiting vegetables would be prohibited despite EPA agreeing that the benefits were high for several of the neonicotinoids.
    - *Any critical need for foliar uses in cucurbit and fruiting vegetables needs to be identified in comments to the docket.*

Proposed Crop Stage Restrictions for Clothianidin

Crop/Crop Group	Proposed Risk Mitigation
Cucurbits	The agency is proposing a crop stage restriction for both foliar and soil labels, to prohibit use from vining to harvest or after the emergence of the first true (non-cotyledon) leaf

Proposed Crop Stage Restrictions for Thiamethoxam

Crop/Crop Group	Proposed Mitigation
Cucurbits	The agency is proposing a crop stage restriction for foliar labels only, to prohibit use vining to harvest or after the emergence of the first true (non-cotyledon) leaf.
Fruiting Vegetables	The agency is proposing a crop stage restriction for both foliar and soil labels, to not apply after the appearance of the initial flower buds until flowering is complete and all petals have fallen off. Additionally, for tomatoes, peppers, chili peppers and okra only, EPA is also proposing to not apply after 5 days after planting or transplanting regardless of application method.
Pome Fruit	The agency is proposing crop stage restrictions for foliar labels only, to not apply from bud-break (also known as "swollen bud stage" in pear or "silver-tip stage" in apple) until after petal fall is complete.
Stone Fruit	The agency is proposing a crop stage restriction for foliar labels, to prohibit foliar application from bud break until after petal fall is complete.
Tree Nuts	The agency is proposing the following crop stage restrictions for foliar labels only: For walnuts and pecans: "Do not apply prior to bud break or until after petal fall is complete." For other tree nut crops: "Do not apply prior to bloom or until after petal fall is complete."
Avocado, banana, dates and olives	The agency is proposing a crop stage restriction for foliar labels, to prohibit foliar application pre-bloom until after flowering is complete and all petals have fallen off.

Proposed Crop Stage Restrictions for Imidacloprid

Crop/Crop Group	Proposed Risk Mitigation
Cucurbits	The agency is proposing a crop stage restriction for both foliar and soil labels, to prohibit use from vining to harvest or after the emergence of the first true (non-cotyledon) leaf
Fruiting Vegetables	For both foliar and soil applications: prohibit application after the appearance of the initial flower buds until flowering is complete and all petals have fallen off. For tomatoes, peppers, chili peppers and okra only: Do not apply after 5 days after planting or transplanting regardless of application method.
Tropical and Subtropical Fruit (avocado, banana, dates, and olives only)	For foliar applications: prohibit foliar application pre-bloom until after flowering is complete and all petals have fallen off; and for soil applications: prohibit post-bloom application.

Proposed Crop Stage Restrictions for Dinotefuran

Crop/Crop Group	Proposed Risk Mitigation
Fruiting Vegetables	The agency is proposing a crop stage restriction for both foliar and soil labels, to not apply after the appearance of the initial flower buds until flowering is complete and all petals have fallen off. Additionally, for tomatoes, peppers, chili peppers and okra only, EPA is also proposing to not apply after 5 days after planting or transplanting regardless of application method.
Stone Fruit	The agency is proposing crop stage restrictions to prohibit application from bud-break (also known as "swollen bud stage" in pear or "silver-tip stage" in apple) until after petal fall is complete.

Reducing Spray Drift and Runoff

- EPA is working to apply mandatory spray drift and runoff mitigation language that is similar across all pesticide classes under registration review including sulfonylureas, pyrethroids and now neonicotinoids.
- Most of the new mitigation language, while not perfect, is acceptable. However, the most problematic wording in this section is regarding droplet size for air and ground applications. The proposed language states "Applicators are required to use a medium or coarser droplet size" as defined by ASABE.S572.1 (see ASABE table below).
    - This recommendation is problematic in two ways: 1) the language is worded in a way that makes compliance unlikely and open to litigation. Applicators strive to reduce the level of "fine" droplet sizes during applications, but to ensure "all" droplets are medium to coarse is not realistic; and 2) efficacy considerations must be included when determining droplet size ranges. For neonicotinoids, medium droplets are not an issue since the products are systemic and translaminar. However, when pesticides are "contact" in nature, coverage is essential so coarse sizes may be ineffective.
    - *Recommendation: Ask EPA to consider more realistic language such as "Applicators are required to use **nozzles** that are designed to emit medium or coarser droplets." The average droplet size ranges for nozzles are readily available from the manufacturer and is something the applicators can control. This language would achieve EPAs goal in a manner that allows the grower to be compliant.*
    - EPAs consideration of efficacy based on droplet size is referenced in the proposed advisory language under "Importance of Droplet Size". Here EPA states that using larger droplet sizes is beneficial to reduce drift and advises the applicator to use the largest droplet size possible that still provides efficacy. Droplet size requirements have already been stated in the "Mandatory Spray Drift Management" section. A general statement around BMPs might be more appropriate.
    - *Recommendation: Advisory drift language is inconsistent across products. Ask EPA to change the heading "Importance of Droplet Size" heading to a general "Best Management Practices for Reducing Drift". The advisory language could read "Follow best management practices for reducing drift including making appropriate nozzle selection; using lower pressure; increasing flow rate; lowering boom height; monitoring application speed; and avoiding applications during adverse weather."*

Droplet Size VMD Range	ASABE S-572.1 Classification Category	Color Code
Under 60	Extremely Fine (XF)	Purple
60-105	Very Fine (VF)	Red
106-235	Fine (F)	Orange
236-340	Medium (M)	Yellow
341-403	Coarse (C)	Blue
404-502	Very Coarse (VC)	Green
503-665	Extremely Coarse (XC)	White
Over 665	Ultra Coarse (UC)	Black