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Protection of Pollinator Health: **Pollinators and Neonicotinoids**

Report to the State Legislature

As Required by RCW 17.21.445

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Washington State Department of Agriculture

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REPORT TO THE LEGISLATURE

Protection of Pollinator Health: Pollinators and Neonicotinoids

As Required by RCW 17.21.445

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Executive Summary

The Washington State Legislature directed the Washington State Department of Agriculture (WSDA) to produce a report that includes recommendations addressing risks of harm to bees and other pollinators from the use of neonicotinoid pesticides and treated seeds.

Most of the more than 300 commercial agricultural crops produced in Washington State rely on pollinators-- bees, birds, bats, and insects. Some pollinator species are experiencing declines in health and population, which threatens the integrity of biodiversity, food supply, economic viability, and human health.

Acetamiprid, clothianidin, dinotefuran, imidacloprid, and thiamethoxam are chemicals collectively known as neonicotinoids (*neonics). This group of insecticides are used on a wide variety of crops, turf, ornamentals, and pets (for flea and tick treatment), as well as having other residential and commercial indoor and outdoor uses.

WSDA completed this pollinator-specific analysis of regulatory programs in Washington State, other states, and federally in accordance with the statute that requested the report. This report does not include any analysis of broader possible effects of neonicotinoid use in urban or rural settings in the state. It also does not include a broad literature review of other potential exposure pathways.

To write this report, WSDA began by analyzing all current data related to bee deaths from pesticides found in the Pesticide Management Division's Pesticide Compliance and Enforcement Database. The database records all pesticide investigations, inspections, and other case materials for the previous seven years. In addition, the department researched all regulations specifically intended to protect bees since 1961.

This research found WSDA knew of no bee deaths related to neonicotinoid pesticide applications or seed treatments in the past seven years. In addition, WSDA conducted an analysis of ALL bee death cases in the past seven years. Those findings showed that of 18 complaints related to bee deaths, five were related to pesticides.

The department also collected information on neonicotinoid-treated seeds. In areas of the U.S. where many miles and millions of acres of corn and soybeans were planted, concerns about bees related to neonic-treated seeds emerged in the early 2010s, because the dust produced caused harm to bees. Seed manufacturers removed the dust-creating ingredients from their formulations, which reduced or removed harm to bees from this practice.

Neonicotinoid-treated seeds are currently used for a number of crops in Washington State. However, Washington produces no soybeans and very little corn. There have been no documented cases associated with the use of neonicotinoid-treated seeds in Washington. This statement does not address broader concerns or issues surrounding the potential exposure of wildlife and pollinators to treated seed.

Compared to other insecticides, neonicotinoids are relatively harmless to beneficial insects, worms, amphibians, birds, and mammals, including humans. Due to product cancelation and movement away from more toxic pesticides, the agricultural industry no longer uses many of the older insecticides for pest control. Neonicotinoids are one tool in the insect control toolbox at a time when many Washington crop growers may lack effective and safer alternatives.

The historical record shows that WSDA imposed additional restrictions on the use of pesticides whenever they negatively affected pollinators.

**Neonicotinoids are commonly referred to as "neonics" and this term may be used interchangeably throughout the report.*

The department considers bees and pollinators extremely important to agriculture and the environment. WSDA, and its Pesticide Management Division (PMD) in particular, are charged with protecting human health and the environment while supporting economic viability for agriculture. In addition to regulating pesticides, PMD conducts outreach to homeowners and agricultural users encouraging best management practices for protecting bees from pesticides.

PMD will implement needed restrictions on neonicotinoids or other pesticides that are shown to cause harm to bees, pollinators, humans, or the environment. However, at this time, WSDA has not found significant regulatory evidence that current neonicotinoid use patterns harm bees or pollinators in Washington. If other reliable sources provide scientific evidence of harm to bees and pollinators under similar uses, climate, and species as in Washington, the department will work with the Legislature on steps to prevent adverse effects.

Future work recommendations include an in-depth analysis of both lethal and sub-lethal effects of neonicotinoids on fish and wildlife; research on available insecticides for homeowner uses; outreach on alternatives to neonicotinoids; and finally, a full report with additional recommendations to the legislature on broader neonicotinoid insecticide impacts in Washington.

1.0 Introduction

Second Substitute Senate Bill 5253, passed during the 2021 regular legislative session, directed the Washington State Department of Agriculture (WSDA) to produce a report by Dec. 31, 2021 that includes recommendations to address risks of harm to bees and other pollinators from the use of neonicotinoid pesticides and treated seeds. Additionally, the Legislature asked the department to evaluate and incorporate reviews the U.S. Environmental Protection Agency (EPA) completes in 2021, including EPA's recommended mitigation measures. Lastly, the Legislature directed WSDA to review neonicotinoid-specific use restrictions and labeling requirements adopted in other states and include recommendations for adopting similar requirements in this state.

SSSB 5253 was incorporated into statute under RCW 17.21.445. Full text of the section:

> *(3) By December 31, 2021, the department shall provide a report to the appropriate committees of the senate and House of Representatives, in compliance with RCW 43.01.036, that includes recommendations for measures to mitigate the risks of harm to bees and other pollinators from the use of neonicotinoid pesticides and treated seeds. The department shall evaluate and incorporate the reviews scheduled for completion by the United States environmental protection agency during 2021, including recommended mitigation measures from that agency. The department shall also review neonicotinoid pesticide use restrictions and labeling requirements adopted in other states and include in the report any recommendations for adoption of similar requirements in this state."*

2.0 Washington State's Role in Pollinator Protection

2.1 History of Pollinator-Specific Regulations in Washington

Washington State Department of Agriculture's (WSDA) Pesticide Management Division (PMD) is the state lead agency responsible for enforcing pesticide laws and rules under the Federal Insecticide, Rodenticide, and Fungicide Act (FIFRA) and the state Pesticide Control Act, Chapter 15.58 Revised Code of Washington (RCW); the state Pesticide Application Act, Chapter 17.21 RCW and various state pesticide rules. Most of these rules appear in The General Pesticide Rules, Washington Administrative Code (WAC) 16-228 and 16-230. Under these laws and rules, PMD regulates the use, distribution, storage, and disposal of pesticides to protect public health and the environment.

PMD has been active in protecting pollinators from pesticides. Historically, WSDA worked with Washington State University (WSU) entomologists, beekeepers and agricultural growers. Many Washington growers require pollinators to produce their crops, such as tree fruits, berries and seed crops. Bees are required to pollinate many of the diverse fruit and vegetables that Washington State produces.

WSDA has a history of developing regulations to protect bees and other pollinators. In the 1920s, the agency placed restrictions on aerial pesticide applications in the vicinity of blooming fruit orchards for pollinator protection.

In 1962, WSDA developed rules to prevent harm to pollinators by prohibiting the application of various insecticides on blossoming alfalfa and clover crops. While limited to Kittitas and Walla Walla counties at the time where most of these crops were grown, the rules restricted application to certain times of day when pollinators were not active. This regulation continues today in WAC 16-230-030. In 1964, additional regulations were added for blossoming mint applications and pollen-shedding corn, which can be attractive to bees. In February 1984, many insecticides were prohibited from being applied to blossoming alfalfa, clover and mint. Later in 1984, additional counties were added to WAC 16-230 prohibitions, including Yakima, Franklin, Adams and Grant, restricting applications during certain times of year. In 1988, WSDA began requiring a "Special Permit" for applying pesticides in blossoming alfalfa, clover, and mint restricted areas to ensure rules protecting pollinators were being followed.

Many of these restrictions are now on pesticide labels regulated by U.S. Environmental Protection Agency (EPA). However, EPA was not established until 1970, well after these restrictions were already in place in Washington State.

Additionally, WSDA has added regulations and restrictions whenever PMD's Pesticide Compliance Program found evidence that a new insecticide was killing beneficial pollinators. Examples include pesticides no longer distributed or used in the United States – such as Penn Cap M (methyl parathion), Parathion, and Supracide (methidathion). Regulations restricting these uses are no longer found in WAC because the products have been federally cancelled and are no longer available.

In more recent history, WSDA added definitions and new labeling requirements for pollinator protection in WAC 16-228. In 2003, WSDA issued a rule making thiamethoxam (a new neonicotinoid at the time) a Restricted Use Pesticide (RUP). This was within the first two years of this new insecticide being distributed in the state. Bee deaths documented between 2001 and 2002 showed that the neonicotinoid thiamethoxam was causing bee deaths in agricultural settings, particularly when the pesticide had been applied to pome fruits during bloom (including apples and pears). WSDA determined that the registered EPA label was not protective enough to prevent harm to pollinators and imposed new regulations that prohibited use on pome fruits during bloom. The new regulations also required that this pesticide only be sold by licensed pesticide dealers and distributed or applied by, or under the direct supervision of, a

licensed pesticide applicator.

In 2013, EPA added many restrictions to pesticide labels that Washington State already had in place for over 10 years.

The timely development and robust enforcement of these rules -- along with work with growers on how to prevent harm to bees and public outreach on best management practices -- has helped to minimize bee deaths related to pesticides in Washington State.

2.2 Pesticide Management Division Pollinator Protection Outreach

In 2010, PMD developed a brochure called **"**10 Ways to Protect Bees from Pesticides." This informative and widely distributed brochure detailed 10 ways that pesticide users, including the general public, can mitigate adverse effects of pesticides on pollinators. Information included the importance of reading and understanding the label and avoiding application during bloom or when pollinators were actively foraging. The brochure specifically addressed neonicotinoid pesticides and cautioned users that these should only be used after flower petals have fallen because of the toxicity to bees for several days after application.

This brochure was distributed to all licensed applicators, dealers, and consultants in Washington State and added to WSDA's website and WSU Pesticide Safety Education Program presentations.

A copy of the brochure can be found in Appendix 1.

2.3 Washington State Managed Pollinator Protection Plan for Alfalfa Seed Production

WSDA collaborated with WSU in 2017 to create a Washington State Managed Pollinator Protection Plan specifically for alfalfa seed production. The alfalfa seed industry relies on alkali bees and leaf cutting bees to pollinate alfalfa and generate the seed crop. Lygus bug is the most invasive pest in the production of alfalfa seed. It is critical that insecticide applications to control lygus bug not impact pollinators. The award-winning pamphlet about the plan was nationally recognized by the Entomological Society of America in 2018. A copy of this document can be found on WSU's website.

2.4 Washington State's Managed Pollinator Protection Plan

In 2018, WSDA developed and published a Managed Pollinator Protection Plan in response to a national movement focused on pollinator protection. This plan describes best management practices BMP) for beekeepers, landowners, growers, and pesticide applicators. The plan offers additional BMPs to protect bees from pesticides. It also focuses on many challenges pollinators face including habitat, pests (Varroa mite and others), bee management, research and apiary program needs, and communication between growers and beekeepers. A copy of the document can be found on WSDA's website.

2.5 Washington State Pollinator Health Bills, Taskforce, Funding and Current Progress

In 2019, the State Legislature drafted a bill focused on protecting pollinators, SB 5552. This bill, called the Pollinator Health Bill, created a state Pollinator Health Task Force led by WSDA, and made pollinators and pollinator habitat a priority for all land managing state agencies. The task force completed a recommendation report by fall 2020. In 2021, the Legislature passed an additional bill, SB 5253, which fulfills the recommendations of the task force. This includes funding for the various agencies tasked with implementing changes and policies to improve things like pollinator habitat and to revise practices that could affect pollinators. The task force is currently on schedule to finish an implementation plan for the bill by the end of 2021. The plan includes projects to increase pollinator habitat, protect pollinators from

pesticides, increase education and outreach about pollinators, address issues with managed pollinators, and recommend further research and other measures to improve pollinator health. Task Force | Washington State Department of Agriculture

2.6 Washington State Neonicotinoid Product Registration Overview

WSDA PMD Pesticide Registration Services Program reviews every pesticide label intended for distribution in Washington State. The Registration Services Program is made up of scientific pesticide experts who review pesticide labels for compliance with federal pesticide rules, state pesticide rules, ingredient and inert ingredient review, and more, including any specific labeling requirements for pesticides that pose a risk to harm pollinators or other species. Whenever a new pesticide active ingredient is submitted to WSDA for registration, it must be evaluated by the department's environmental toxicologist who specifically reviews the new product for environmental impacts, including pollinators, aquatic use and other potential risks. If either the toxicologist or one of the registration specialists see a problem with a new active ingredient, the division and possibly with other agencies assess any potential adverse effects to the state before registering the product. WSDA's Registration Services Program currently registers over 15,500 pesticides.

Of all the registered neonicotinoid pesticides, over half (53% or 286 products) are intended for homeowner use. Of these homeowner products, nearly half (134) are flea and tick products for pets (collars, spot-on treatments). Other uses include homeowner products for controlling flies, ants, roaches, termites, and bedbugs, as well as insect control products for gardens, trees and ornamentals.

The remainder of the products (47% or 255 products) are intended for agricultural or commercial use. Some of Washington's large-acreage crops that use neonicotinoid pesticides are apples, cherries, hops, potatoes, and wheat. Washington is a national leader in producing other important specialty crops like raspberries, blueberries, mint, onions and pears. In order to sell these agricultural or commercial use pesticides, Washington State retailers must have a pesticide dealer endorsement on their Master Business License. They must also have a licensed dealer manager staff person on-site to provide information and answer questions for purchasers of any commercial or agricultural use pesticide. Some of the commercial or agricultural use pesticides containing neonicotinoids are classified as restricted use, and only qualified licensed and certified pesticide applicators are authorized to purchase and/or use these products.

A list of crops and sites that use neonicotinoid pesticides is found in Appendix 2.

3.0 Washington State Neonicotinoid Pesticide Compliance Overview

WSDA reviewed all case investigations that involved neonicotinoid insecticides for the past seven years (records retention period). From 2014-2020, 17 confirmed violations involved neonicotinoids. Most cases (41%) were related to orchard air blast applications, followed by residential interior applications (35%).

Bee Cases (0)

No bee cases were related to neonicotinoid insecticides.

Agricultural/Human Health Cases (3)

Three human health complaints stemmed from air blast orchard (cherry, pear, and apple) applications where bystanders (bike, motorcycle or scooter riders) traveled on a roadside adjacent to a pesticide application zone. Human health impacts were low or none.

Residential/Human Health Cases (5)
Five human health cases involved commercial interior treatments for insects (fleas, bedbugs or cockroaches). Human health impacts were low or none.

Agriculture/Non-Human Health Cases (6)

- Four cases were related to orchard (apple, pear) air blast applications involving drift.
- One case involved a chemigation (pesticides applied through irrigation water) application on a carrot field. This application affected organic blueberries due to potential residue issues.
- One case was an intentional dumping/disposal of treated corn seed, which was cleaned up before causing any harm.

Residential/Non-Human Health Cases (3)

- Two cases involved exterior landscaping applications. Of these, one was a mixing error that involved an herbicide being mixed with the insecticide that resulted in damaged plants. The other consisted of an insecticide application that drifted onto a neighbor's land.
- The third case was an interior application case that resulted in furniture damage.

Non-neonicotinoid Pesticide Cases (5)
WSDA also analyzed of ALL bee death cases in the past seven years. The findings showed that of the 18 alleged bee death cases, five were related to pesticides (none were neonicotinoids). One was an alleged intentional bee kill from application to bee hives, which was forwarded to the sheriff's department. One case involved a homemade pesticide created by a commercial beekeeper to control Varroa mite in his hives, one was a label misuse, and two cases involved pesticide detection where the source could not be determined. In all these cases, none of the pesticides were neonicotinoids.

3.1 Neonicotinoid Treated Seed:

A commonly used application method for the neonicotinoids is seed treatment, which involves a pesticide coating applied to seeds before planting. This method of application raised concerns in 2012 and 2013 when a high number of honey bee mortality incidents were discovered, primarily in the Midwest where large acreages of soybean and corn are grown. These honey bee mortalities were reported to regulatory agencies in the United States and Canada. It was determined that these incidents were caused by exposure to dust contaminated with neonicotinoid residues from treated seeds. The neonicotinoid-contaminated dust was created by abrasive friction between seeds and from talc or graphite powder commonly used as a fluency agent in planting equipment and environmental conditions. Contaminated dust, often referred to as abraded seed coat dust, was emitted into the air through planting equipment, such as pneumatic seeders and planter models with exhaust vents. Once in the air, the dust moved off the field and contaminated vegetation surrounding large acreages of planted corn and soybean fields.

To address pollinator exposure to neonicotinoid-contaminated dust, EPA and the U.S. Department of Agriculture (USDA) held a Summit on Reducing Exposure to Dust from Treated Seed[1] on March 5, 2013 aimed at identifying technology, including best management practices and stewardship activities that could effectively reduce acute pollinator exposure from abraded seed coat dust. The Seed Treatment Group Presentations[2] at the 2013 summit specifically addressed information regarding formulation technology, seed applied additives, coatings, and new polymer technologies. To date, EPA has not formally conducted a risk assessment on the potential risks from exposure to abraded seed coat dust,

[1] https://www.epa.gov/pollinator-protection/2013-summit-reducing-exposure-dust-treated-seed
[2] https://www.epa.gov/pollinator-protection/presentations-2013-pollinator-summit-seed-treatment-group

because the agency currently does not have a method to reliably quantify exposure by this route. EPA acknowledges in its current risk evaluations for neonicotinoids that this is an area of uncertainty. EPA notes that it considers the primary route of exposure from treated seed applications to be through pollen and nectar of the treated plants themselves.

EPA also has not implemented any mandatory risk mitigation measures aimed at reducing potential risks to pollinators from abraded seed coat dust. EPA instead notes that "the Agency is working with different stakeholders to identify best management practices and to promote technology-based solutions that reduce this potential route of exposure."[3]

The Canadian government's Pest Management Regulatory Agency (PMRA) has also responded to the issue of abraded seed coat dust in a similar fashion by focusing its overall efforts on identifying technology improvements and best management practices. PMRA's response, however, has also included implementing mandatory risk mitigation measures in 2014 to protect pollinator from abraded seed coat dust. PMRA's risk reduction measures included[4] requiring:

- New labeling for treated seed.
- Registrants to follow a treated seed dust technical standard.
- Registrants to report improvements in seed coating technology that reduces seed coat abrasion and the creation of dust.
- Registrants to report new seed flow lubricants to replace talc and graphite.
- Equipment manufacturers to ensure new planting equipment adheres to International Standard (ISO 17962:2015[5])

In 2015, PMRA introduced an additional requirement regarding the use of seed flow lubricant[6]. This additional requirement stated that:
"When using a seed flow lubricant for planting corn or soybean seed treated with neonicotinoid insecticides clothianidin, thiamethoxam or imidacloprid, only a dust-reducing fluency agent is permitted to minimize the potential for abrasion that produces insecticidal seed dust. Talc and graphite are not permitted to be used as a seed flow lubricant for corn or soybean seed treated with these insecticides. Carefully follow the use directions provided with the dust-reducing fluency agent."

PMRA estimates that with current mitigation measures in place "the number of bee incidents in 2014, 2015 and 2016 were 70-80% lower than in 2013," and the agency continued to see a downward trend in 2017-2019.

In Washington State, the majority of acreage that uses neonicotinoid treated seed is wheat, potatoes, dry beans, peas, and other large seeded vegetables. Fortunately, pollinators are not typically attracted to these crops. Pollen-shedding corn can occasionally be an issue, but Washington has had many restrictions on this crop and use of insecticides during this part of the growth cycle for over 50 years.

The majority of pollinated crops in Washington agriculture are tree fruits, berries and grapes. Growers of these crops must be extremely careful to remove their managed pollinators during pesticide treatments to ensure they don't harm the bees. Washington growers have been growing these blooming crops with

[3] https://www.regulations.gov/document/EPA-HQ-OPP-2008-0844-1611
[4] https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/cps-spc/alt_formats/pdf/pubs/pest/_fact-fiche/pollinator-protection-pollinisateurs/pollinator-protection-pollinisateurs-eng.pdf
[5] https://www.iso.org/standard/61136.html
[6] https://www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/fact-sheets-other-resources/pollinator-treated-seed/best-management-practices.html

the aid of managed pollinators for close to a century. They are well educated on how to protect pollinators and are given continuing education information on pollinator protection annually by both WSU and WSDA. Preventing harm to bees and other pollinators are essential to producing fruits and vegetables, as harming bees is not in their best interest financially or environmentally.

Washington State has no record of bees harmed from neonicotinoid or other insecticide treated seed applications in recent history. Although, in Europe, Canada and the mid-west where miles of recently seeded corn and soybean crops caused issues with bees in the early 2010's, the manufacturers of the seed treatments altered their formulations to prevent the dust, greatly reducing harm to pollinators. Washington has never had a known case of bee harm related to neonicotinoid treated seeds and their dust.

3.2 Neonicotinoid drench/foliar applications

There are a number of registered uses of neonicotinoid insecticides that allow for homeowner, landscape and nursery applications to either bulbs, flowers, trees, or flowering ornamentals. Those uses could result in plant uptake of the insecticide(s) and expression of residual insecticide in flower pollen. Currently, there are restrictions on application of these insecticides when plants are flowering; those restrictions would not protect against plant uptake from foliar or soil drench applications. Washington State has not had cases associated with pollinator deaths and these types of uses in the past seven years. Previous bee kills in the state of Oregon associated with blooming linden trees have led to restrictions on the use of neonicotinoids on specific woody flowering trees.

4.0 Environmental Protection Agency's Role in Pollinator Protection

EPA has authority under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. 136 et seq., to regulate the sale and use of pesticides through the registration process. To issue a pesticide registration, EPA must determine that the pesticide will not cause unreasonable adverse effects to the environment. This finding takes into account the risks and benefits of a pesticide to both humans and the environment, including pollinators. The registration of a pesticide includes approval of a label that provides critical information about how to safely and legally handle and use the pesticide product. Unlike most product labels, pesticide labels are legally enforceable, and it is a violation of federal law to use the pesticide product in a manner inconsistent with its labeling. A key function of the pesticide product label is to manage potential risks from pesticides, such as potential unreasonable adverse effects on non-target organisms, including pollinator species.

4.1 EPA Labeling Statements for Protection of Pollinators

In general, pesticides that are EPA evaluated as "highly toxic to bees" or "toxic to bees" have language within the Environmental Hazards section of product labels that indicate the pesticide product may adversely harm bees. In 2013, EPA instituted new labeling requirements for foliarly applied pesticides (including neonicotinoids) that may harm pollinators. These requirements include the addition of a Pollinator Protection Box and additional Directions for Use on the product label. A partial example of the box can be seen in Figure 2 or a complete box example in Appendix 3. EPA's Pollinator Protection requirements include a prominent labelling section warning users of application restrictions. A *"Bee Hazard Icon"* is displayed next to use directions for application sites known to be attractive to pollinators.

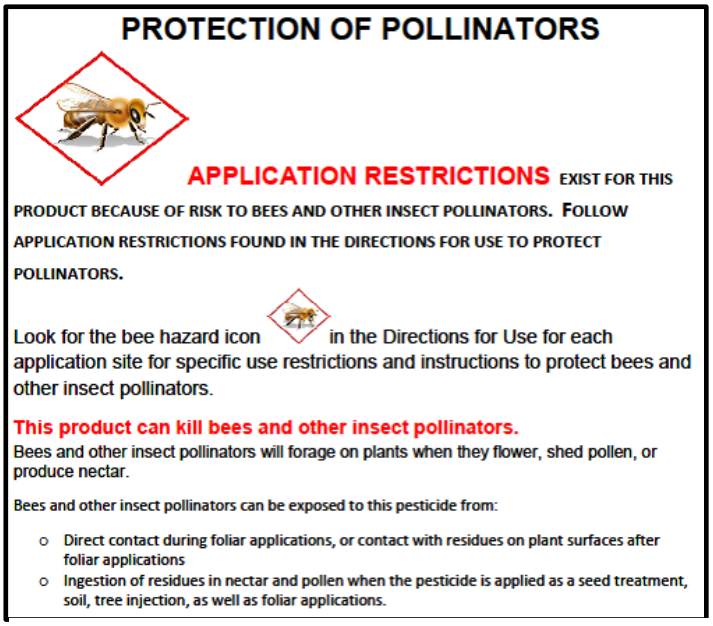

Figure 1: A partial example of a Pollinator Protection Box.

4.2 EPA's Review of Neonicotinoid pesticides

4.2.a Overview of Registration Review

EPA is currently conducting a review of neonicotinoid pesticides as part of a process called Registration Review[7]. Registration Review is a multiple step, iterative process wherein:

> *EPA will review each registered pesticide at least every 15 years to determine whether it continues to meet the FIFRA standard for registration. Pesticides registered before 1984 have been reevaluated initially under the reregistration program. These pesticides also are subject to registration review. (…) We must complete registration review by October 1, 2022, for all pesticides registered as of October 1, 2007. The Agency's planned final work plans, draft risk assessments, and decision documents for fiscal year 2021 are reflected in the Registration Review Schedules. New pesticide active ingredients will be added to the schedule so they will complete registration review within 15 years of their registration date.*

Under FIFRA, EPA is required to ensure that registered pesticides will not cause unreasonable adverse effects to humans or the environment. In order to assess the safety of pesticides, EPA conducts a variety of risk assessments that model the predicted effects of registered pesticides.

EPA is currently in the process of completing its registration review process for the neonicotinoid pesticides. EPA has decided to review the neonicotinoids concurrently to ensure consistency across this class of pesticides. All of the documents that pertain to the Registration Review of the neonicotinoids are contained in the following public dockets at Regulations.gov[8]: EPA-HQ-OPP-2012-0329[9] (acetamiprid);

[7] For a detailed explanation of Registration Review visit - https://www.epa.gov/pesticide-reevaluation/registration-review-process

[8] http://www.regulations.gov/

[9] https://www.regulations.gov/docket/EPA-HQ-OPP-2012-0329

EPA-HQ-OPP-2011-0865[10] (clothianidin); EPA-HQ-OPP-2011-0920[11] (dinotefuran); EPA-HQ-OPP-2008-0844[12] (imidacloprid); and EPA-HQ-OPP-2011-0581[13] (thiamethoxam). As part of the registration review process, EPA has completed rigorous scientific risk assessments regarding five neonicotinoid active ingredients and for all of their registered uses. These risk assessments cover a broad range of topics that are intended to evaluate potential risks to human health and the environment from the use of registered products.

4.2.b EPA's Pollinator Risk Assessments for Neonicotinoids

The following sections are intended to provide a summary of information regarding EPA's risk conclusions, proposed mitigation measures, and cost benefit analysis as they relate to pollinator protection.

EPA has conducted ecological risk assessments for five neonicotinoid pesticides. They estimate the potential environmental risks under all scenarios in which each pesticide might be used. EPA has specifically conducted in-depth analyses of the potential risks to managed and native pollinators for clothianidin, dinotefuran, imidacloprid, and thiamethoxam during its risk assessment process in support of registration review. The draft Pollinator Risk assessment for imidacloprid was released for public comment in 2016, and the draft Pollinator Risk assessments for clothianidin, thiamethoxam, and dinotefuran were released for public comment in 2017. The Final Pollinator Risk assessments for those four chemicals were released in 2020 and can be found in their respective registration review dockets. EPA also conducted analyses of the potential risks to managed and native pollinators for acetamiprid. A preliminary Environmental Fate and Ecological Risk Assessment for acetamiprid was released for public comment 2018 and can be found in the acetamiprid registration review docket.

In these risk assessments, EPA examined the risks for pollinators at the individual organism level for adults and larva from acute and chronic exposure with data from Tier I studies that measure effects in individual bees. Various routes of exposure were considered including direct contact with spray droplets and from oral ingestion via pollen and nectar. EPA also used data from Tier II (colony feeding and semi-field tunnel studies) and Tier III (full field studies) to evaluate risk at the colony level. EPA assessed exposure at the Tier I level by using robust data sets from field studies that measured residue levels in pollen and nectar from a variety of bee-attractive crops (cotton, cucurbits, citrus, stone fruit, pome fruit, tree nuts, berries/small fruits, and ornamentals). EPA also considered application and exposure timing (pre-bloom and post-bloom) for foliar and soil application methods. Potential risks from exposure via pollen and nectar from trunk injection and seed treatment applications were evaluated in the risk assessments as well.

4.2.c Proposed Interim Registration Review Decisions and Mitigation Measures

When EPA identifies potential risks to pollinators or other non-target species in the ecological risk assessments during registration reviews, EPA can address these risks by introducing mitigation measures via Proposed Interim Decisions (PIDs). In January 2020, EPA released the PIDs for each of the neonicotinoids[14] and opened a public comment period. In the PIDs, EPA proposed mitigation measures in order to address risks identified in the human health and ecological risk assessments. The goal of the mitigation measures is to address any identified risks and ensure that the registered uses of neonicotinoids do not cause unreasonable adverse effects to human health or the environment. Final

[10] https://www.regulations.gov/docket/EPA-HQ-OPP-2011-0865
[11] https://www.regulations.gov/docket/EPA-HQ-OPP-2011-0920
[12] https://www.regulations.gov/docket/EPA-HQ-OPP-2008-0844
[13] https://www.regulations.gov/docket/EPA-HQ-OPP-2011-0581
[14] https://www.epa.gov/pollinator-protection/proposed-interim-registration-review-decision-neonicotinoids

mitigation measures will be effective with the release of an Interim Registration Review Decision or a Final Registration Review Decision. Interim Registration Review Decisions for acetamiprid, clothianidin, dinotefuran, imidacloprid, and thiamethoxam are currently pending, as are any mitigation measures, but according to EPA, they are scheduled to be issued in late 2022. WSDA will provide an addendum to this report to the Legislature within six months of the issuance of EPA's Registration Review Interim Decision summarizing EPA's interim mitigation measures.

Proposed mitigation measures identified in the Proposed Interim Decisions for neonicotinoids to address risks associated with current registered uses of neonicotinoid chemicals include:

- Cancelation of residential spray applications to turf.
- Cancelation of foliar spray and soil drench uses on bulb vegetables [9 Crop Group 3: Bulb Vegetable - Garlic, Leeks, Onions- dry bulb, Welsh and green, and Shallots].
- Maximum annual application rate reductions for most uses to mitigate potential risk to pollinators and to reduce the potential overall exposure of neonicotinoids to non-target organisms and to reduce overall environmental loading.
- Application timing restrictions to limit bee exposure during critical periods in the growing season when exposures to pollinators are more likely to occur.
- Addition of advisory language for residential ornamental uses of "Intended for use by professional applicators."
- Addition of mandatory spray drift management and runoff reduction label language intended to reduce off-site transport.
- Restrictions/prohibitions of use on blooming crops in order to protect bees.
- Develop and promote voluntary stewardship efforts, encourage the use of best management practices, and increasing awareness of potential impacts of pesticides through education and outreach to applicators and beekeepers.

4.3 Federal Endangered Species Act Consultation

The EPA is required to evaluate effects of a pesticide to federally endangered or threatened species and their designated critical habitat in what is referred to as a biological evaluation. This is done separately from the registration review process described above. EPA released draft biological evaluations for imidacloprid, clothianidin, and thiamethoxam for public comment on August 25, 2021[15]. In the draft biological evaluations, EPA found that the three neonics will likely adversely affect certain listed species or their designated critical habitat. Once a final biological evaluation for all three neonics is complete, the EPA will initiate section 7(a)(2) of the U.S. Endangered Species Act[16] (ESA) which requires consultation with National Marine Fisheries Service[17] and the U.S. Fish and Wildlife Service[18] (collectively referred to as the Services) due to their "likely to adversely affect" determination. Consultation is required to ensure that actions taken by federal agencies do not jeopardize the continued existence of any species listed as threatened or endangered under the ESA and will not destroy or adversely modify any designated critical habitat. In this case, the federal action is registration review under FIFRA of pesticide products containing one of the three neonicotinoids. In order for EPA to complete the consultation process and registration review, EPA will first need to institute any agreed upon mitigation measures that are required to ensure the protection of the listed species and their designated critical habitat.

[15] https://www.epa.gov/pesticides/epa-releases-draft-biological-evaluations-three-neonicotinoids-public-comment
[16] https://www.epa.gov/endangered-species/assessing-pesticides-under-endangered-species-act
[17] https://www.fisheries.noaa.gov/national/consultations/pesticide-consultations
[18] https://www.fws.gov/endangered/what-we-do/pesticide-consultation.html

EPA will collect public comments and anticipates that the final biological evaluations for imidacloprid, clothianidin, and thiamethoxam will be issued in June 2022. If the ESA consultation results in additional mitigation measures or restrictions required to protect a listed pollinator(s), WSDA will provide an addendum to this report to the Legislature within six months that summarizes any mandatory or advisory protections for listed species that are pollinators.

Although not currently scheduled, acetamiprid and dinotefuran will likely undergo ESA section 7 consultation when those compounds are evaluated during the FIFRA registration review process and their respective biological evaluations are completed.

4.4 Final Registration Review Decisions

Projected due dates for the release of Final Registration Review Decisions have not been announced yet. WSDA will provide an addendum to this report to the Legislature within six months of EPA's Final Registration Review Decision being issued that summarizes any new mitigation measures, including any specific to pollinators that are listed as threatened or endangered species that arise as a result of consultation with the National Fish and Wildlife Services.

5.0 Relative Acute Toxicity of Insecticides by Class

While the neonicotinoids represent an important class of pesticides, several other classes of registered pesticide active ingredients are widely used for similar purposes. Some of the most common classes of insecticides include organophosphate, carbamates, pyrethroids and pyrethrins. Figure 2 presents a general comparison between the neonicotinoids and representative pesticide examples using toxicity data from studies generated to evaluate acute toxicity to honeybees. This is not a complete list of insecticides considered toxic to bees.

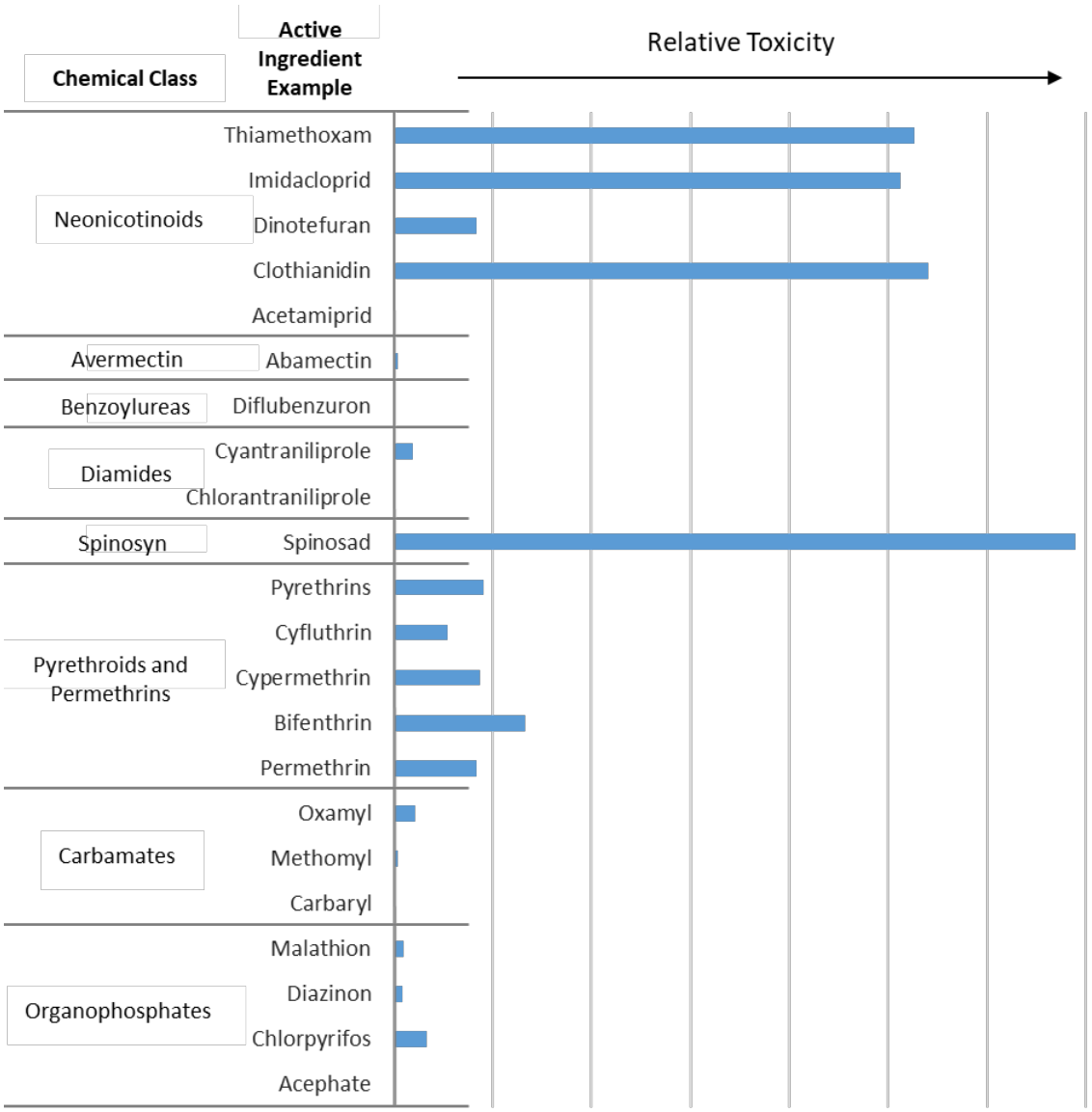

Figure 2: Graph of Relative Toxicities of Example Insecticides to Bees.

Toxicity data from studies generated following EPA-provided test guidelines are commonly used to determine acute or chronic toxicity of pesticides to organisms such as bees, fish, macroinvertebrates, birds, and mammals. Researchers calculate acute toxicity endpoints by exposing a sensitive (representative) species at a susceptible life stage to a range of pesticide concentrations to determine potential negative effects. Bees were tested with chemical contact or oral exposure in a laboratory setting. The exposure with the highest toxicity was chosen for representation in the graph. Values from Figure 1 are based on the lowest LC_{50} values for acute toxicity endpoints available in EPA's most current ecological risk assessments. The LC_{50} in this context is the concentration of the chemical that causes death to 50% of the bees exposed (either orally or by contact) to the chemical within 96 hours.

In Figure 2, the chemicals with shorter bars are less toxic to bees than chemicals with longer bars. However, 19 of the 22 chemicals listed are considered “highly toxic to bees” by EPA toxicity evaluations with acute toxicity endpoints below 2 ug/bee. The remaining three pesticides are considered toxic (acetamiprid and chlorantraniliprole) or relatively nontoxic (diflubenzuron) to bees. While this is a useful table, acute toxicity to bees is only one of many metrics important to consider when comparing pesticides. As can be seen from the graph, some insecticides such as spinosad are more toxic to bees

than any of the neonicotinoids. Conversely, insecticides are potentially less harmful to bees, such as the organophosphates, but may be harmful to other organisms in the environment, such as fish and macroinvertebrates.

6.0 Neonicotinoid Use Restrictions/Labeling Requirements Adopted in Other States

WSDA evaluated neonicotinoid restrictions in other states by conducting online research and categorizing the types of restrictions. Generally, existing and recently proposed restrictions limit the sale and/or use of neonicotinoid products.

Ten states (WA, CT, MA, MD, ME, MN, NJ, NY, OR, VT) currently have at least one type of restriction that directly or indirectly limits the sale and/or use of neonicotinoid products (see Appendix 4 for enacted restrictions). Washington has the strongest restrictions, set in 2003 by rule, that make all sale of thiamethoxam restricted-use applicable in all counties in Washington, for all sites and uses. Five states (CT, MA, NJ, NY, and VT) enacted a restriction limiting certain outdoor uses of products. Three states enacted specific use restrictions including; two states (CT and OR) prohibited use on linden and basswood trees and one state (ME) prohibited use on outdoor residential landscapes (such as lawn, turf, or ornamental vegetation). Other types of state restrictions include: prohibiting specific uses via pesticide registration and/or federal pesticide product labeling (NY and OR), requiring a permit for sellers (MD), limiting who can use the products (MD), and limiting the advertising/labeling of treated plants as beneficial to pollinators (MN).

Ten states proposed at least one restriction via legislation in 2021 that did not pass or is still active (see Appendix 5 for proposed restrictions). Most of the proposals did not pass; however, several proposals (CA, MD, NY, VA, and WI) are still pending. The proposed restrictions are similar to existing restrictions in other states.However, one unique difference is that four states (CA, MN, NM, and NY) proposed restrictions related to treated seed. One state (CA) proposed prohibiting use of neonicotinoids on seed and three states (MN, NM, NY) proposed restrictions for the labeling, sale, distribution, or purchase of treated seed.

7.0 Recommendations

WSDA's Pesticide Management Division (PMD) has been active in protecting pollinators from pesticides. WSDA has swiftly enacted rules and restrictions to restrict pesticide use that may cause harm to pollinators. Many of these pollinator protection rules are still found in WAC. In addition, WSDA has created and distributed brochures and managed pollinator protection plans, and conducted training sessions to pesticide applicators and the public.

Washington has had no confirmed managed or native bee deaths due to neonicotinoid pesticide applications in the past seven years.

WSDA's Pesticide Compliance, Registration, Licensing and Recertification, and Education and Outreach Programs will continue to observe, document, and work to prevent pollinator harm from neonicotinoids and/or other pesticides.

Although Washington State has experienced no known recent impacts to pollinators related to neonicotinoids, WSDA is open to developing rules that adopt the additional recommendations proposed by EPA to protect pollinators. - WSDA is recommending the following:

- Cancel residential spray applications to turf. This should reduce the potential overall exposure of neonicotinoids to non-target organisms and reduce overall environmental loading without affecting important uses of these crop protection tools in agricultural settings.
- Cancel foliar spray and soil drench uses on flowering bulb vegetables, and on linden and basswood trees.
- Establish application timing restrictions to limit bee exposure during critical periods in the growing season when exposures to pollinators are more likely to occur. Washington already does this in agriculture and it is on many of the agricultural pesticide labels.
- WSDA and WDFW should collaborate on and complete an in-depth study of lethal and sub-lethal impacts on wildlife and aquatic organisms from neonicotinoid insecticides. This research, and any recommendations, must be provided to the legislature no later than December 31, 2022 in time for the 2023 legislative session.
- WSDA recommends that WSDA and WSU collaborate to develop and launch a public education campaign through the WSU Extension and Master Gardener Program about limited and prescriptive uses of insecticides by homeowners.
- Develop outreach and education around alternatives to neonicotinoid insecticides for use in non-agricultural settings.
- Add mandatory spray drift management and runoff reduction label language intended to reduce off-site transport. This is a label change that EPA would make. WSDA instead proposes requesting funding to study the potential off-site transport currently occurring to our surface water monitoring sites and proposals from this study to include specific mitigation requirements (such as vegetative spray drift buffers, field end boundaries) to landowners as needed in areas where this is occurring.
- Develop and promote voluntary stewardship efforts, encourage the use of best management practices, and increase awareness of potential impacts of pesticides through education and outreach to applicators and beekeepers.
- WSDA recommends developing additional BMP outreach materials, working with WSU for agriculture, professional ornamental applicators and homeowners to increase awareness and voluntary stewardship to further protect pollinators.
- WSDA recommends continuing the research, funding and focus on pollinator health that has already been enacted. Additionally, we recommend that any action on any specific crop protection tools (inducing neonicotinoids and others) needed by agriculture be based on scientific findings, analysis presented, and data gathered by the Pollinator Health Task Force, WSU, WSDA, WDFW and others. WSDA will work with these groups to enact any future needed restrictions.

7.1 Additional WSDA PMD Recommendations:

PMD believes one necessary component to protect pollinator health is an active apiary program (education, inspection, hive registration) at WSDA. PMD understands that the majority of the apiary program was cut from the budget and authority of WSDA about 20 years ago because beekeepers did not want to pay fees to support the program or have state regulators enforce apiary laws to protect managed pollinators. States around the country with strong apiary programs such as California, Florida, North Carolina and North Dakota have been able to study impacts to managed pollinators and native pollinators continually. Unfortunately, when funding and authority was cut from WSDA's statutes, the agency was not able to monitor pollinator health, conduct research, assist PMD Compliance with bee mortality complaints (determining when issues are related to pesticide or bee health), take action on illegally managed bees, enforce regulations to ensure beekeepers are using legal pesticides, and manage invasive pests such as Varroa mite and diseases.

PMD recommends that the Legislature re-establish and fund a robust apiary program at WSDA to collect data, monitor bee health, assist PMD on bee death case investigations, and enforce regulations on

commercial and hobby beekeepers that will support and protect pollinator health. Charging beekeepers is not appropriate or feasible. Most beekeepers don't want to share bee locations. This makes it difficult for growers to prevent pesticide exposures if they are unaware of nearby bees. Beekeepers should either register their hives upon entry into Washington so WSDA can inspect and advise them on any health issues, or submit to regular inspections and conversations with trained apiarists who will promote and enforce bee health needs.

WSDA PMD recommends for WSDA's Plant Protection Division:

- Funding a statewide apiary program with a minimum of 3-4 apiarists to collect bees and other pollinators, and data to study pollinator health and all causes of mortality.
- Restricting conditions for cross-state and cross-country transport of honey bees.
- Require cleaning or replacement of dirty bee boxes from other states prior to entry in Washington to remove and prevent the buildup of pesticides and diseases in the comb and wax, and bee boxes.
- Adding enforcement authority back into WSDA statutes for unregistered beehives and trespassing bees to bring beekeepers in compliance with state laws and rules, including appropriate civil penalties to deter illegal behavior. This can also help support bee health by restricting illegal hives in Washington.

WSDA PMD recommends for Washington State University:

- Research to find the primary and secondary causes of honey bee mortality in agriculture and require a report to the Legislature and USDA biannually.
- Research tools needed to prevent bee mortality in agriculture.
- Establish a state of the art research program on treatment for viruses and other diseases in managed honey bees.

Appendices

Appendix 1 : **WSDA Brochure "10 Ways to Protect Bees from Pesticides"**

What are neonicotinoids?

Neonicotinoids are a class of insecticides used to control aphids, weevils and other insects. Some neonicotinoids may be highly toxic to bees for up to several days after an application. The Washington State Department of Agriculture recommends care when applying any pesticide, regardless of the type, to help protect our state's pollinating insects.

10. Educate yourself. Visit some of these sources of information on bees and pesticides:
    - www.beeinformed.org – Bee Informed Partnership
    - www.entomology.umn.edu/cues/pollinators – Center for Urban Ecology and Sustainability / Pollinator Conservation
    - www.npic.orst.edu – National Pesticide Information Center
    - www.pesticidestewardship.org – Pesticide Environmental Stewardship (click Pollinator Protection link)
    - www.pollinator.org – Pollinator Partnership
    - extension.wsu.edu/wsprs/Pages/default.aspx – WSU PICOL
    - pep.wsu.edu – WSU Urban Integrated Pest Management and Pesticide Safety Education

Questions?

Contact WSDA at pestreg@agr.wa.gov or Erik Johansen at (360) 902-2078. You can also visit agr.wa.gov for more information.

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Do you need this publication in an alternate format? Contact the WSDA Receptionist at (360) 902-1976 or TTY Relay (800) 833-6388.

Photos courtesy of Erik Johansen.

10 Ways to Protect Bees from Pesticides

Washington State Department of Agriculture

Pesticide Management Division

We need bees!

Honey bees, bumble bees, mason bees and other pollinating insects pollinate your fruit and vegetable gardens, native plants, and are critical for our environment and our economy.

The proper use of pest control products can help maintain healthy ornamental plants. Some pesticides, including those in the class of neonicotinoids, may pose a potential risk to bees and other insects that benefit us. You can help reduce that risk.

How you can help protect our bees

1. Avoid applying any pesticides, including insecticides and fungicides, during bloom on ornamental plants that attract bees, like heather, lavender, linden, rhododendron and rose. Bees and other insects may be harmed if they consume nectar or pollen containing pesticides.
2. Apply pesticides only after flower petals have fallen, when ornamental plants are less attractive to bees. This will reduce the risk to bees coming in contact with pesticides.
3. If you must spray ornamental plants that are in bloom, WSDA recommends you choose a pesticide that is less toxic to bees. The Oregon State University extension publication "How to Reduce Bee Poisoning from Pesticides" has information on the toxicity of pesticides to bees. Visit pubs.wsu.edu for a copy of this publication.

4. Follow any specific requirements to protect bees on the pesticide label. The WSU Pesticide Information Center Online (PICOL) has a database of pesticides approved for sale in Washington.
5. Read the label to see if the pesticide contains a neonicotinoid insecticide with these ingredients:
   - Clothianidin
   - Dinotefuran
   - Imidacloprid
   - Thiamethoxam

   Insecticides containing these ingredients should only be used after flower petals have fallen, because they may be highly toxic to bees for several days after application.
6. Avoid applying these neonicotinoid insecticides by soil drench or tree injection methods to plants known to attract bees. These methods may contaminate nectar and pollen for up to several years after the insecticide is applied.
7. If you must use soil drench or tree injection to apply these neonicotinoid insecticides, do it after flower petals have fallen and use the lowest possible effective dosage to help reduce the risk to bees. Also, try to select an insecticide that offers the shortest persistence in ornamental plants while still controlling the pest.
8. When buying ornamental plants that are known to attract bees, try to buy plants not treated with insecticides containing any of the 4 ingredients listed above.
9. For more advice on pesticide use and protecting bees, consider contacting your local branch of the Washington State University Master Gardener Program by visiting gardening.wsu.edu and look for the Master Gardener link.

Appendix 2: **List of Crops/Sites on Pesticide Product Labels containing Neonicotinoids**

Use Designation: AG = Agriculture, Blank = Homeowner

ALFALFA	AG
ALMOND	AG
ALMOND (NON-BEARING)	AG
ANIMAL QUARTERS	
ANISE	AG
APPLE	AG
APPLE (NON-BEARING)	AG
APRICOT	AG
APRICOT (NON-BEARING)	AG
ARTICHOKE (GLOBE)	AG
ARTICHOKE (JERUSALEM)	AG
ARUGULA	AG
ASPARAGUS	AG
ASPHALT/CEMENT	
BARLEY	AG
BEAN (BROAD)	AG
BEAN (DRY)	AG
BEAN (GREEN)	AG
BEAN (GREENHOUSE)	AG
BEAN (KIDNEY)	AG
BEAN (LIMA)	AG
BEAN (MUNG)	AG
BEAN (NAVY)	AG
BEAN (PINTO)	AG
BEET	AG
BLACKBERRY	AG
BLACKBERRY EVERGREEN	AG
BLACKBERRY (NON-BEARING)	AG
BLUEBERRY (NON-BEARING)	AG
BLUEBERRY -HIGH BUSH	AG
BLUEBERRY MIDDLE ROWS	AG
BOAT	
BOYSENBERRY	AG
BOYSENBERRY (NON-BEARING)	AG
BROCCOLI	AG
BROCCOLI (CHINESE)	AG
BRUSSELS SPROUT	AG
BUCKWHEAT	AG
BUILDING	
BUILDING (ADJACENT AREA)	

BUILDING (AGR. PRODUCTION)	
CABBAGE	AG
CANOLA	AG
CANTALOUPE	AG
CARROT	AG
CAT	
CAULIFLOWER	AG
CELERY	AG
CELERY (GREENHOUSE)	AG
CHERRY	AG
CHERRY (NON-BEARING)	AG
CHESTNUT	AG
CHESTNUT (NON-BEARING)	AG
CHICKPEA	AG
CHICORY	AG
CHINESE CABBAGE	AG
CHIVE	AG
CHRISTMAS TREE NURSERY	AG
CHRISTMAS TREE PLANTATION	AG
CILANTRO/CORIANDER	AG
CLOVER	AG
COLE CROP (GREENHOUSE)	AG
COLLARD	AG
COMMERCIAL BUILDING	
CONIFER	AG
CONIFER (GREENHOUSE)	AG
CONIFER NURSERY	AG
CONTAINER (AGRICULTURE)	AG
CONTAINER (NON-AGR.)	
CORN (FIELD)	AG
CORN (FIELD) SEED CROP	AG
CORN (SWEET)	AG
CORN (SWEET) SEED CROP	AG
CRABAPPLE	AG
CRABAPPLE (NON-BEARING)	AG
CRANBERRY	AG
CRANBERRY (NON-BEARING)	AG
CRANBERRY (POST HARVEST)	AG
CUCUMBER	AG
CUCUMBER (GREENHOUSE)	AG

CURRANT	AG
CURRANT (NON-BEARING)	AG
CUT STUMP	
DAIRY BUILDING	
DANDELION	AG
DEWBERRY	AG
DILL	AG
DOG	
DOUGLAS FIR SEED ORCHARD	AG
DOUGLAS FIR SEEDLING NURSERY	AG
EDAMAME	AG
EGGPLANT	AG
ELDERBERRY	AG
ENDIVE	AG
ENDIVE (GREENHOUSE)	AG
FABRIC	
FARM BUILDING	
FARM BUILDING AREA AROUND	
FENCEROW	
FENNEL (FLORENCE)	AG
FILBERT	AG
FILBERT (NON-BEARING)	AG
FIREWOOD	
FLAX	AG
FLAX SEED CROP	AG
FOOD HANDLING AREA	
FOOD PROCESSING AREA	
FOREST	AG
FOREST NURSERY/SEED ORCHARD	AG
FOREST PLANTATION	AG
FOREST RECREATION	AG
FORMULATING/MANUFACTURING	AG
GARLIC	AG
GINSENG	AG
GOLF COURSE	
GOOSEBERRY	AG
GOOSEBERRY (NON-BEARING)	AG
GRAIN STORAGE BUILDING	
GRAPE	AG
GRAPE (NON-BEARING)	AG
GRASS	
GREENHOUSE	AG
HERB	AG

HOME GARDEN	
HOME INDOOR	
HOME OUTDOOR	
HONEYDEW	AG
HOP	AG
HORSERADISH	AG
HOSPITAL	
HOUSEPLANT	
INDOOR LANDSCAPE PLANT	
INDUSTRIAL BUILDING	
INDUSTRIAL SITE	
JUNEBERRY	AG
KALE	AG
KIWI	AG
KIWI (NON-BEARING)	AG
KOHLRABI	AG
LAWN	
LEEK	AG
LENTIL	AG
LETTUCE	AG
LETTUCE (GREENHOUSE)	AG
LINGONBERRY	AG
LIVESTOCK BUILDING NON-DAIRY	
LOGANBERRY	AG
LUPINE	AG
MELON (ALL TYPES)	AG
MILLET	AG
MINT	AG
MUNICIPAL BUILDING	
MUSKMELON	AG
MUSTARD (GREENS) SEED CROP	AG
MUSTARD GREENS	AG
MUSTARD SEED/OIL	AG
NECTARINE	AG
NECTARINE (NON-BEARING)	AG
NONCROP AGRICULTURAL AREA	
NURSERY	AG
NURSERY (GREENHOUSE)	AG
OAT	AG
OKRA	AG
OLALLIEBERRY	AG
ONION (DRY BULB)	AG
ONION (GREEN)	AG

ORNAMENTAL	
ORNAMENTAL (GREENHOUSE)	
ORNAMENTAL BULB	
ORNAMENTAL BULB (GREENHOUSE)	
ORNAMENTAL BULB-EASTER LILY	
ORNAMENTAL BULB-IRIS	
ORNAMENTAL DECIDUOUS/SHADE TREE	
ORNAMENTAL EVERGREEN TREE	
ORNAMENTAL FLOWER	
ORNAMENTAL FLOWER (GREENHOUSE)	
ORNAMENTAL GROUND COVER	
ORNAMENTAL ROSE	
ORNAMENTAL ROSE (GREENHOUSE)	
ORNAMENTAL SHRUB	
ORNAMENTAL SHRUB (GREENHOUSE)	
ORNAMENTAL TREE	
ORNAMENTAL VINE	
OUTDOOR NON-SPECIFIC	
PARSLEY	AG
PARSNIP	AG
PATIO	
PEA (DRY)	AG
PEA (GREEN)	AG
PEACH	AG
PEACH (NON-BEARING)	AG
PEANUT	AG
PEAR	AG
PEAR (NON-BEARING)	AG
PEPPER	AG
PEPPER (BELL)	AG
PEPPER (GREENHOUSE)	AG
PEPPER (NON-BELL)	AG
PIMENTO	AG
PLUM	AG
PLUM (NON-BEARING)	AG
POPCORN	AG
POTATO	AG
POTATO SEED CROP	AG
POULTRY BUILDING/YARD	

PRUNE	AG
PRUNE (NON-BEARING)	AG
PUMPKIN	AG
QUINCE	AG
QUINCE (NON-BEARING)	AG
RADISH	AG
RADISH (GREENHOUSE)	AG
RAPE GREENS	AG
RASPBERRY	AG
RASPBERRY (NON-BEARING)	AG
RECREATION AREA	
RESIDENTIAL AREA OUTDOOR	
RHUBARB	AG
RIGHT-OF-WAY (RAILROAD)	
RIGHT-OF-WAY (ROADSIDE)	
RIGHT-OF-WAY (UTILITY)	
ROSEMARY	AG
ROW MIDDLE	
RUTABAGA	AG
RYE	AG
SAFFLOWER	AG
SAFFLOWER SEED CROP	AG
SALAL	AG
SALSIFY	AG
SCHOOL INDOOR	
SCHOOL OUTDOOR	
SEEDS	AG
SEWER	
SHALLOT	AG
SILAGE (CORN)	AG
SOD FARM	AG
SORGHUM	AG
SOYBEAN	AG
SPINACH	AG
SPINACH (NEW ZEALAND)	AG
SQUASH (SUMMER TYPES)	AG
SQUASH (WINTER TYPES)	AG
STORED FRUIT AND VEGETABLE	
STORED GRAIN	
STORED PROCESSED FOOD	
STORED PRODUCT BUILDING	
STRAWBERRY	AG
STRAWBERRY (GREENHOUSE)	AG

STRAWBERRY (NON-BEARING)	AG
SUGARBEET	AG
SUGARBEET SEED CROP	AG
SUNFLOWER	AG
SWEET POTATO	AG
SWISS CHARD	AG
TOBACCO	AG
TOMATILLO	AG
TOMATO	AG
TOMATO (GREENHOUSE)	AG
TREE PULP/WOOD PRODUCTION	
TRITICALE	AG
TURF	AG
TURNIP	AG

VEGETABLE SEEDLING CROP (GREENHOUSE)	AG
WALNUT	AG
WALNUT (NON-BEARING)	AG
WASTELAND	
WATERCRESS	AG
WATERCRESS (GREENHOUSE)	AG
WATERMELON	AG
WHEAT	AG
WOOD PRODUCT	
YAM	AG
YARD PLANT	
YOUNGBERRY	AG

Appendix 3: **Environmental Protection Agency Protection of Pollinators Label Requirements**

PROTECTION OF POLLINATORS

APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.

Look for the bee hazard icon  in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators.

Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to pollinator attractive habitat can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at:
http://pesticidestewardship.org/PollinatorProtection/Pages/default.aspx.

Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state, go to: www.aapco.org/officials.html. Pesticide incidents should also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: beekill@epa.gov

DIRECTIONS FOR USE

1. FOR CROPS UNDER CONTRACTED POLLINATION SERVICES

Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen unless the following condition has been met.

If an application must be made when managed bees are at the treatment site, the beekeeper providing the pollination services must be notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying.

2. FOR FOOD CROPS AND COMMERCIALLY GROWN ORNAMENTALS NOT UNDER CONTRACT FOR POLLINATION SERVICES BUT ARE ATTRACTIVE TO POLLINATORS

Do not apply this product while bees are foraging. Do not apply this product until flowering is complete and all petals have fallen unless one of the following conditions is met:

- **The application is made to the target site after sunset**
- **The application is made to the target site when temperatures are below 55˚F**
- **The application is made in accordance with a government-initiated public health response**
- **The application is made in accordance with an active state-administered apiary registry program where beekeepers are notified no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying**
- **The application is made due to an imminent threat of significant crop loss, and a documented determination consistent with an IPM plan or predetermined economic threshold is met. Every effort should be made to notify beekeepers no less than 48-hours prior to the time of the planned application so that the bees can be removed, covered or otherwise protected prior to spraying.**

3. Non-Agricultural Products:

Do not apply [insert name of product] while bees are foraging. Do not apply [insert name of product] to plants that are flowering. Only apply after all flower petals have fallen off.

Appendix 4: Neonicotinoid Restrictions Enacted in Washington and Other States:

	Type of restriction enacted through legislation or otherwise implemented	Number of states	States	Brief details
1	RUP classification	6	WA	All uses of Thiamethoxam – distribution and use only by licensed individuals.
			CT	All products labeled for treating plants
			MA	RUP if labeled for outdoor non-structural use or outdoor non-agricultural use (includes lawn, turf, ornamentals, gardens)
			NJ	Required to adopt rules by October 2021; exceptions for certain uses
			NY*	Certain ingredients/uses are classified as RUP
			VT	Products approved for outdoor use
2	Use prohibitions	3	CT	Linden/basswood; and Plants bearing blossoms
			ME	Outdoor residential landscapes (such as lawn, turf, or ornamental vegetation)
			OR	Linden/basswood trees or other Tilia species.
3	Sales restrictions	1	MD	RUP dealer permit required to sell if labeled for outdoor use
4	User restrictions	1	MD	Only certified applicators, farmers, and veterinarians can apply
5	Advertising/labeling of treated plants	1	MN	Prohibits treated plants from being labeled or advertised as beneficial to pollinators
6	Registration and/or pesticide labeling	2	NY*	Many of the active ingredients are registered with various use restrictions that limit outdoor exposure; federal product labels for certain active ingredients/uses must state specific language.
			OR*	Prohibition of use on linden/basswood trees or other Tilia species is stated on federal product labels

* All listed restrictions were enacted through legislation except the two NY restrictions and the OR label restriction, which were implemented through program policy. New York maintains a running list of conditions placed on registration by active ingredient.

Appendix 5: Neonicotinoid Restrictions Proposed in Other States through Legislation in 2021

	Type of restriction proposed in 2021 legislation	Number of states	States	Brief details	Status
1	RUP classification	1	NV	Would classify all neonics as RUPs	In committee (died)
2	Use prohibitions	6	IA	Would prohibit all uses	Died
			CA	Would prohibit use on seed beginning in 2024	In committee (since 02/18/2021)
			NM	Would limit uses, with exceptions	Not passed
			NV	Would prohibit use on state land	In committee (died)
			NY	Would prohibit use on outdoor ornamental plants and turf, except for invasive species management, beginning in 2023	Passed senate; in assembly (active status as of 8/27/2021)
			VA	Would prohibit outdoor residential use on plants without applicator certification or meeting managed beehive requirements.	In committee (since 02/05/2021)
3	Sales restrictions	3	AZ	Would prohibit sale except by RUP-licensed persons	Died
			IA	Would prohibit all sales and purchases	Died
			MD	Would limit sales only to a certain certified applicator or farmer; Would require seller to store product in manner inaccessible to customers	Passed both chambers; to governor for signature. (current as of 8/27/2021)
4	User restrictions	1	AZ	Would prohibit use except by certified applicators, farmers, veterinarians, and wood preservers	Died
5	Treated seed and/or plants	4	MN	Would require caution statement on label for treated corn/soybean seed; State would not issue a permit to a labeler of treated corn/soybean seed unless labeler implements stewardship	Introduced - Dead

				program to collect any unsold or unwanted treated seeds.	
			NM	Would prohibit sale of treated seed and plants unless properly labeled with neonicotinoid information	Not passed
			NY	Would prohibit sale/distribution/purchase of treated seeds (corn, soybean, or wheat) beginning in 2024	Passed senate; in assembly (active status as of 8/27/2021)
			WI	Would prohibit labeling/advertising of treated plants as beneficial to pollinators	In committee (since 07/21/2021)
6	Distribution / transportation	1	NM	Would prohibit distribution/transportation of products without a granted exception	Not passed
7	Granting authority to local government	1	WI	Would allow a political subdivision to regulate pesticides for the purpose of protecting pollinators and pollinator habitats.	In committee (since 07/21/2021)