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Agricultural Innovation Board

2024 Annual Report

Morgan Griffith, Agrichemical Program Manager
House Committee on Agriculture, Food Resiliency, and Forestry – May 1, 2025

IPM Definition

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Vermont Rule for Control of Pesticides

1.39 Integrated Pest Management means an ecosystem-based strategy that focuses on longterm prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

BMP Rulemaking Legislative Charge

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6 V.S.A. § 1105a (c)

(2) In developing the rules with the Agricultural Innovation Board, the Secretary shall address:

(A) establishment of threshold levels of pest pressure required prior to use of neonicotinoid treated article seeds or neonicotinoid pesticides;

(B) availability of nontreated article seeds that are not neonicotinoid treated article seeds;

(C) economic impact from crop loss as compared to crop yield when neonicotinoid treated article seeds or neonicotinoid pesticides are used;

(D) relative toxicities of different neonicotinoid treated article seeds or neonicotinoid pesticides and the effects of neonicotinoid treated article seeds or neonicotinoid pesticides on human health and the environment;

(E) surveillance and monitoring techniques for in-field pest pressure;

(F) ways to reduce pest harborage from conservation tillage practices; and

(G) criteria for a system of approval of neonicotinoid treated article seeds or neonicotinoid pesticides.

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To address (A) – (G), AIB went to the experts…

AIB heard presentations from 17 external subject matter experts

- **Alexander Sereno**, Regional Director USDA Risk Management Agency
- **Dr. Heather Darby**, UVM Extension
- **Dr. Scott McArt**, Associate Professor of pollinator health, Department of Entomology, Cornell University
- **Dr. John Tooker**, Professor of Entomology/State IPM Coordinator, Penn State College of Agricultural Sciences
- **Louis Robert**, Agronomist Emeritus, Ministry of Agriculture, Fisheries, Aquaculture, and Food of Quebec
- **Emilie Bergeron**, Vice President Chemistry, CropLife Canada
- **Christine Hazel**, Global Regulatory Leader, Corteva Agriscience
- **Tracey Baute**, Ontario Ministry of Agriculture, Food and Rural Affairs
- **Elson Shields**, Professor of Entomology Emeritus, Cornell University
- **Lucas Rhoads**, Natural Resources Defense Council
- **Gene Harrington**, Biotechnology Innovation Organization
- **Andrew Munkres**, Vermont Beekeepers Association
- **Paul Hoekstra**, Grain Farmers of Ontario
- **Brad Van Kooten**, US Category Lead, Seed Applied Technologies, Pioneer® Corteva Agriscience
- **David Kosztyo**, District Sales Leader, Pioneer® Corteva Agriscience
- **Spencer Hardy**, Vermont Center for Ecostudies
- **Laura Johnson**, Pollinator Specialist, UVM Extension

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To address (A) – (G), AIB went to the experts…

AIB heard presentations from State employees and AIB members

- **Dr. Terence Bradshaw**, Associate Professor and Chair, Department of Plant and Soil Science, UVM
- **Dr. Sarah Owen**, State Toxicologist, Vermont Department of Health
- **Jill Goss**, Feed, Seed & Fertilizer Specialist, AAFM
- **Stephanie Smith**, Deputy Director, AAFM
- **Morgan Griffith**, Agrichemical Program Manager, AAFM
- **Pam Bryer, PhD**, Agrichemical Toxicologist, AAFM

AIB Considerations

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6 V.S.A. § 1105a

(c)(2)(A) establishment of threshold levels of pest pressure required prior to use of neonicotinoid treated article seeds or neonicotinoid pesticides;

(E) surveillance and monitoring techniques for in-field pest pressure;

- Seed purchasing occurs months ahead of the season (September – November prior to April/May planting).
- Scouting the field for pests in the spring before planting unlikely to influence what type of seeds to purchase and plant.
- Scouting the field in the fall before seed purchase does not provide a clear indicator of pest levels in the next spring.
- Few methods are available for scouting for corn seed maggot and no economic thresholds are established for this pest.

AIB Considerations

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6 V.S.A. § 1105a

(c)(2)(A) establishment of threshold levels of pest pressure required prior to use of neonicotinoid treated article seeds or neonicotinoid pesticides;

(E) surveillance and monitoring techniques for in-field pest pressure;

- Monitoring the emergence of corn seed maggot flies through in-field scouting and growing degree day calculators offers growers an option to time planting between emerging fly generations to reduce risk of injury.
  - There can be multiple generations of corn seed maggot in VT, but the first generation causes the most significant damage, especially when the corn is slow to germinate.
- Corn seed maggot is unpredictable. It can appear before or after planting. Corn is vulnerable to corn seed maggot injury 7-30 days from planting.
- There is no insecticide rescue treatment. Re-planting is the only option.

AIB Considerations

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6 V.S.A. § 1105a

(c)(2)(A) establishment of threshold levels of pest pressure required prior to use of neonicotinoid treated article seeds or neonicotinoid pesticides;

(E) surveillance and monitoring techniques for in-field pest pressure;

- Prior to introduction of seed treatments, protection was afforded by insecticides applied to soil during planting at much higher rates
- Use of treated seed has been widespread, potentially resulting in a "halo" effect, where treatment has reduced population to extent that untreated seed plantings are protected to some extent
- Basic IPM principles including monitoring, thresholds, alternative pest control methods, and mitigating risks for general neonicotinoid pesticide use has been recommended in previously published BMPs

NTS Conclusion – Research is needed on predicting occurrence so decisions can be made on types of protection.

Neonic Pesticide Conclusion – include IPM based BMPs, but specific threshold levels and guidance that is subject to change with continued research should be kept outside of the rule so these guidelines can adjust with research results

AIB Considerations

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6 V.S.A. § 1105a

(c)(2) (B) availability of nontreated article seeds that are not neonicotinoid treated article seeds;

- Limited availability of untreated corn seed varieties and maturities
- Producers who order untreated seed cannot exchange for different maturities/varieties closer to planting time, if conditions change.
- Completely untreated corn is available
- Fungicide-only treatments are difficult to purchase
- Limiting seed options for VT farmers would put them at a disadvantage in terms of having options and flexibility in seed performance, seed choices, and makes it more difficult for farmers to adapt to climate change.
- VT is a small market and it is difficult to influence the seed production industry

AIB Considerations

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6 V.S.A. § 1105a

(c)(2) (C) economic impact from crop loss as compared to crop yield when neonicotinoid treated article seeds or neonicotinoid pesticides are used

- Research comparing fungicide-only treated seed to neonicotinoid and fungicide treated seed shows inconsistent yield differences, if any.
- No clear trend for increased yield with neonicotinoid treated seeds compared to untreated or fungicide-only treated seed.
- Most studies showed no yield difference between treated vs. non-treated
- May be influenced by halo effect of past NTS
- Some studies did show an increase in yield
- Saffron growers in New England answered survey that they do not use neonicotinoids

NTS Conclusion – Research needed under VT conditions.

AIB Considerations

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6 V.S.A. § 1105a

(c)(2)(D) relative toxicities of different neonicotinoid treated article seeds or neonicotinoid pesticides and the effects of neonicotinoid treated article seeds or neonicotinoid pesticides on human health and the environment;

- Review of EPA human health risk assessment for imidacloprid
  - Residue on food crop from seed treatment use is negligible
  - Very little risk for exposure to the farmer when seed is purchased already treated
  - The amount of active ingredient per seed is considerably less than the amount of active ingredient applied during in-furrow treatments
  - Neonicotinoids have favorable human health profile compared to the organophosphate insecticides they replaced
  - Neonicotinoids other than imidacloprid would have similar human health risk assessment if they have similar use profile

AIB Considerations

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6 V.S.A. § 1105a

(c)(2) (D) relative toxicities of different neonicotinoid treated article seeds or neonicotinoid pesticides and the effects of neonicotinoid treated article seeds or neonicotinoid pesticides on human health and the environment;

- Imidacloprid, clothianidin and thiamethoxam are classified as highly toxic to honeybees (acute and chronic toxicities)
  Neonicotinoids can have sublethal impacts on honeybee physiology, reproduction and behavior
- Canada's PMRA investigated honeybee mortalities and found that exposure to neonicotinoids in dust generated during planting of treated corn or soybean seed with vacuum planters contributed to the mortalities observed.
- Corn Dust Research Consortium conducted research from 2013-2017 on impacts of dust generation during planting and impacts on pollinators.
  - Bee mortality results associated with planting activities varied between the replicates, with some showing increased mortality with planting activities (Iowa and Ohio) and some showing no difference in mortality (Nebraska).

AIB Considerations

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6 V.S.A. § 1105a

(c)(2)(D) relative toxicities of different neonicotinoid treated article seeds or neonicotinoid pesticides and the effects of neonicotinoid treated article seeds or neonicotinoid pesticides on human health and the environment;

- Sources of neonicotinoid exposures to non-target species come from:
  - Exhausted dust from vacuum planters
  - Soil dust carried over from previous season moved by any activity in the field and by also contributing to abrasion of seed
  - Surface water after rain event within fields and adjacent to fields from fugitive dust
  - Residues blown onto flowering resources including weeds and tree blossoms
- 98% of abrasion comes from soil through the intake of vacuum planters – the solution is to pre-filter followed by post-filter BUT planter modification is not a viable option for VT growers at this time.
- Dust exhausted from vacuum planters that is directed back towards the soil is harmful to ground-dwelling beneficial invertebrates.
  - Dust contains protein and therefore can be attractive to pollinators

AIB Considerations

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6 V.S.A. § 1105a

(c)(2)(D) relative toxicities of different neonicotinoid treated article seeds or neonicotinoid pesticides and the effects of neonicotinoid treated article seeds or neonicotinoid pesticides on human health and the environment;

- Canadian PMRA regulation prohibits the use of talc and graphite as seed lubricants in vacuum planters. Recommend using a dust-reducing fluency agent.
- UVM evaluated seed lubricants available in VT, most growers use talc and graphite, but a dust-reducing fluency agent was available at the local dealer.
- Improvements in polymer coatings for treated seed are reported by the industry to reduce dust generation during seed handling and planting

NTS Conclusion – research on dust generation and impact under VT conditions is needed, outreach and education to growers about reducing impacts from planting operations

Neonic Pesticide Conclusion – EPA registration review of neonicotinoid active ingredients results in mandatory label language to mitigate human health and environmental risks

AIB Considerations

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6 V.S.A. § 1105a

(c)(2) (F) ways to reduce pest harborage from conservation tillage practices

- There is a relationship between type of tillage practice and resulting pest pressures
  - Situation is complex in VT because manure and cover crop incorporation are common and recommended practices
- Conservation tillage practices can reduce corn seed maggot populations because plant residues occur mainly on surface of the soil rather than being incorporated into the soil where decomposition occurs.
  - No-till is less attractive to corn seed maggot because organic matter isn't exposed
  - No-till practices provide habitat for beneficial organisms and increased predator populations
- There is opportunity to learn economic impacts of using untreated seed and planting later in the season to avoid peak pest pressures

Conclusion – Research under VT conditions regarding practices to reduce pest pressures

AIB Considerations

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6 V.S.A. § 1105a

(c)(2) (G) criteria for a system of approval of neonicotinoid treated article seeds or neonicotinoid pesticides

- Ontario regulations require IPM certification (one time, no expiration date) and Pest Assessment Report (formalized scouting report, one time, no expiration) used to gain access to neonicotinoid treated seeds on entire farm property
  - Requirements placed on farmers and technical service providers by provincial regulations were too burdensome to administer the program and therefore were scaled back
  - Transitioned to diamide treated seed
- Quebec requires farmers to obtain agronomic justification and prescription from certified agronomist following an agronomic assessment (valid for 1 year).
  - Requirements are burdensome and have high impact on resources
  - Transitioned to diamide treated seed or insecticide-free seed
- System of approval for NTS and neonicotinoid pesticides will be developed as part of the exemption order processes

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MEMBERS & MEETINGS

- **Wendy Sue Harper** - Ph.D. Soil Biologist, Associate Faculty, Prescott College [AIB Role Fulfillment: Soil Biologist]
- **Amanda St. Pierre** - Dairy Farmer, Pleasant Valley Farms [AIB Role Fulfillment: an active farmer who is a member of an organization representing the conventional dairy industry in Vermont]
  - Appointment commenced April 11, 2023
- **Fitzroy Beckford, Ph.D.** - Associate Dean and Director of UVM Extension in the College of Agriculture and Life Sciences [AIB Role Fulfillment: a member from the University of Vermont Center for Sustainable Agriculture]
- **Nathan Nourse** – Crop Consultant, Blueberry producer [AIB Role Fulfillment: an active farmer who is a member of an organization representing fruit and vegetable farmers in Vermont]
- **Jonathan Chamberlin** - Ag Retail/Crop Consultant, Bourdeau Brothers [AIB Role Fulfillment: a certified crop consultant]
- **Abbi Pajak** - Environmental Analyst, Department of Environmental Conservation, Agency of Natural Resources [AIB Role Fulfillment: the Secretary of Natural Resources or designee]
- **Brian Kemp** - Organic Dairy Farmer, Mountain Meadows Farm [AIB Role Fulfillment: an active farmer who is a member of an organization representing the organic farming community]
- **Ryan Rebozo, Ph.D.** - Director of Conservation Science, Vermont Center for Ecostudies [AIB Role Fulfillment: a member of an environmental organization that advocates for policy regarding the management or reduction of toxic substances in the State]
- **Steven Schubart** - Grass-fed beef operation owner, Grass Cattle Company [AIB Role Fulfillment: an active farmer who is a member of an organization representing grass-based, non-dairy livestock farming in Vermont]

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MEMBERS & MEETINGS

- **Pamela Wadman** - Senior Environmental Health Risk Assessor, Department of Health, Agency of Human Services [AIB Role Fulfillment: the Commissioner of Health or a designee with expertise in the effects of pesticides on human health]
- **Laura DiPietro** - Director, Water Quality Division, Agency of Agriculture, Food & Markets [AIB Role Fulfillment: the Director of the Agency of Agriculture, Food and Markets, Water Quality Program or designee]
- **Morgan Griffith** - Agrichemical Program Manager, Public Health and Agricultural Resource Management Division, Agency of Agriculture, Food & Markets [AIB Role Fulfillment: the Director of the Agency of Agriculture, Food and Markets, Agrichemical Program or designee]
- **Steven Dwinell** - Director, Public Health and Agricultural Resource Management Division, Agency of Agriculture, Food & Markets [AIB Role Fulfillment: the Secretary of the Agency of Agriculture, Food and Markets or designee]

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MEMBERS & MEETINGS

- 8 public meetings in 2024
  - Review of literature and resources
  - Expert witnesses and public comment
  - Publicly accessible Meeting information
- AIB Recommendations Regarding Best Management Practices (BMPs) For Neonicotinoid Treated Article Seeds - Final Report (1/2/24)
- 2024 Annual Report of the Agricultural Innovation Board (AIB)

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WORK OF THE BOARD

- Focus on pollinator health and responsibilities outlined in Act 182 of 2024
- Developed recommendations for BMPs for use of neonic treated seeds and neonic pesticides

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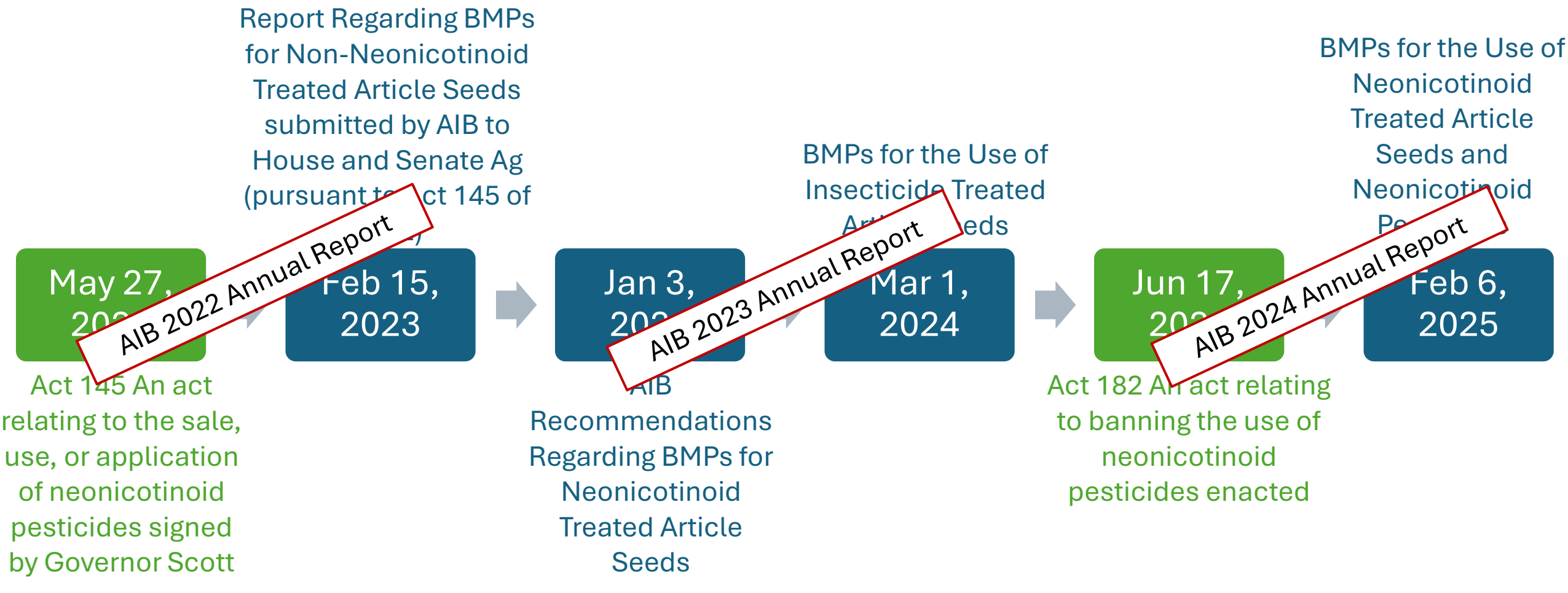
NEONIC BMP REPORTS



NEONIC RELEVANT INFO

- Vermont Wild Bee Report, pollinator surveys & protection recommendations – Spencer Hardy, Vermont Center for Ecostudies
  - 2014 Bumble Bee Survey found that there has been a simplification of bumble bee fauna with fewer species overall
  - 2019-2022 VT Wild Bee Survey identified 353+ species (88% were ground nesting bees)
    - Difficult to compare current populations to sparse historical data
    - Recommendations to improve pollinator habitat included: establishing flowering shrubs in areas not in production; learning more about the impact of tillage and black plastic on ground nesting bees; and, avoiding pesticide sprays during crop bloom and when there are blooming crops in the surrounding areas

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NEONIC RELEVANT INFO

- Neonicotinoid Research Update – Heather Darby, PhD, UVM
  - Repeated study comparing crop stands in treated and untreated seed plots saw far worse crop pest damage in 2024 than in 2023. Cold, wet spring delayed emergence and increased risk for pest damage
  - Preliminary data show that manure applications and standard tillage practices resulted in more pest damage

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NEONIC RELEVANT INFO

- Farming Practices that Support Pollinators – Laura Johnson, Pollinator Specialist, UVM Extension
  - Pollinator Support Plan development tool available to farmers as a guidance on production while supporting pollinators
  - Includes production and land management practices that encourage and help pollinators

NEONIC RELEVANT INFO

- Reviewed any Federal or State neonicotinoid legislative activity
  - Review of EPA Updated Occupational Exposure Assessment for Seed Treatment Uses for Three Neonicotinoids – Pam Bryer, PhD, Agrichemical Toxicologist, AAFM
    - Final Interim Decisions for registration review of neonicotinoids expected in 2025
  - EPA issued advanced notice of proposed rulemaking for treated article seeds to solicit input on how EPA could more closely regulate treated seed
  - New CA law (California AB 1042) outlines label requirements for treated seed bags
    - Label must contain the signal word for the substance with highest level of toxicity
    - Beginning Jan 1, 2027, all pesticide treated seeds labels must include
      - EPA Reg No for each substance on treated seed
      - Quantity of each substance applied by weight or amount per seed
  - WA became 13th state to restrict consumer/residential use of neonics

NEONIC BMP DEVELOPMENT

- AIB members previously consulted with AAFM to fulfill the responsibility outlined in Act 145 of 2022 and provide recommendations for BMPs for the use of treated article seeds in the state
  - Best Management Practices for the Use of Insecticide Treated Article Seeds – submitted to House and Senate Agricultural committees March 1, 2024
- Act 182 expanded the scope to include neonicotinoid pesticides
  - Reviewed, with a lens of (A) – (G) required topics, a comprehensive list of previously published neonicotinoid treated seed and general neonicotinoid pesticide BMPs and previous research compiled by AAFM

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NEONIC BMP RESOURCES

Neonicotinoid BMPs Available

Treated Seed BMPs

American Seed Trade Association (ASTA) – Crop Life America (CLA) The Guide to Seed Treatment Stewardship. ASTA_SeedGuide_Farmers_Update2021.pdf (seed-treatment-guide.com)

Health Canada, Pollinator Protection and Responsible Use of Insecticide Treated Seed. March 2015. treated_seed-semences_traitees-eng.pdf (canada.ca)

Health Canada, Protecting pollinators when using treated seed - best management practices. Amended version - May 2023. Protecting pollinators when using treated seed - best management practices

Ontario Environment & Energy, Best management practices when using insecticide treated seed

Honey Bee Health Coalition, Best Management Practices (BMPs) for Pollinator Protection in Field Corn. February 2020. HBHC_Corn_022020.pdf (honeybeehealthcoalition.org)

Honey Bee Health Coalition, Best Management Practices (BMPs) to Protect Honey Bees and Other Pollinators in Soybean Fields. February 2020. HBHC_Soybean_022020.pdf (honeybeehealthcoalition.org)

Minnesota Department of Agriculture, Stewardship Guidelines and Best Management Practices for Neonicotinoid Insecticide-Treated Seed. May 2019. Stewardship Guidelines and Best Management Pracitces for Neonicotinoid Insecticide-Treated Seed (state.mn.us)

Minnesota Pollution Control Agency, Disposal of Treated Seeds. April 2022. Treated Seeds (state.mn.us)

Stoner, K. Connecticut Agricultural Experiment Station. Best Management Practices for Farmers Using Seeds Treated with Neonicotinoid Insecticides. BMPHandlingNeonicotinoidTreatedSeedspdf.pdf (ct.gov)

Corn Dust Research Consortium (CDRC), Executive Summary & Recommendations. July 2017. CDRC-Executive-Summary-October-2017.pdf (pollinator.org)

General Neonicotinoid BMPs

Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)

Minnesota Department of Agriculture, Stewardship Guidelines and Best Management Practices for Home and Residential Use of Neonicotinoid Pesticides. May 2019. Home and Residential Use of Neonicotinoid Insecticides (state.mn.us)

BMP Type	Best Practice	Sources
IPM	Use cultural, physical, and biological controls and select insect resistant/tolerant crop varieties to avoid or reduce pest risk.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) , Turf & Ornamental Best Management Practices for Pollinator Protection, NE Vegetable Management Guide 2024
IPM	Scout fields regularly and use economic thresholds to help determine if, when, and where to apply	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) , Best Management Practices for Vermont Golf CoursesBest Management Practices for Vermont Golf Courses, second edition. 2022. vermont-bmps.pdf (gcsaa.org) , Turf & Ornamental Best Management Practices for Pollinator Protection, NE Vegetable Management Guide 2024
IPM	Use hot-spot spraying and banding where appropriate to reduce the amount of pesticide applied.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
IPM	Rotate clothianidin and imidacloprid with other insecticides with different mode of action, such as synthetic pyrethroids, organophosphates, and insect growth regulators that are known to be effective.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) , NE Vegetable Management Guide 2024
IPM	Avoid a sequential foliar application of clothianidin/imidacloprid following a seed, soil, or foliar application of clothianidin/imidacloprid.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
IPM	Consider using precision application technology (e.g., auto-steer, auto-boom shutoff, and variable rate sprayer) to avoid overspray, spray overlap, and higher than recommended application rates.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
IPM, Pollinator Protection	Avoid using pesticides or tank mixing pesticides and adjuvants that are known to synergize with each other creating a higher risk to pollinators.	Cornell University, A Guide to Reducing Pesticide Risk to Bees in Tree fruit Orchards. 2023. Pesticide Decision Guide - 2023 - Orchards.pdf , Cornell University, A Pesticide Decision Making Guide to Protect Pollinators in Landscape, Ornamental, and Turf Management. 2019.
IPM	Use spot sprays, perimeter trap crop treatments, refuge plantings, and other methods that prevent the entire field or population from being treated to help preserve susceptible individuals.	NE Vegetable Management Guide 2024
IPM, Pollinator Protection	Time the application so that the most vulnerable insect life stage is exposed to the spray.	NE Vegetable Management Guide 2024

NEONIC BMP DEVELOPMENT

- AIB members completed a survey to prioritize BMPs for neonicotinoid pesticides
  - 9 members completed survey
  - All BMPs that received a high priority ranking were recommended to be included in the draft BMP rule.
- AIB received public comment from The Xerces Society outlining recommended BMPs for neonicotinoid treated article seeds and other uses of neonicotinoid pesticides
  - Recommended BMPs built around basic IPM practices: monitoring, thresholds, and mitigating risks when neonics are used
  - AIB members agreed to identify the minimum standards or practices that are enforceable with the intent to reduce the risk to pollinators
    - specific threshold values and guidance that are subject to change should be maintained outside of the BMP rulemaking process so that they can adapt quickly as more research is conducted

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AIB RECOMMENDATIONS

- AIB members reviewed and recommended specific BMPs pulled from previously published neonicotinoid pollinator protection documents. BMPs include Integrated Pest Management practices as well as practices that reduce the seed dust, spray drift and other potential non-target exposures:

- Use cultural, physical, and biological controls and select insect resistant/tolerant crop varieties to avoid or reduce pest risk
- Scout fields regularly and use economic thresholds to help determine if, when, and where to apply
- Use hot-spot spraying and banding where appropriate to reduce the amount of pesticide applied
- Avoid a sequential foliar application of clothianidin/imidacloprid following a seed, soil, or foliar application of clothianidin/imidacloprid
- Consider using precision application technology (e.g., auto-steer, auto-boom shutoff, and variable rate sprayer) to avoid overspray, spray overlap, and higher than recommended application rates
- Avoid using pesticides or tank mixing pesticides and adjuvants that are known to synergize with each other creating a higher risk to pollinators
- Use equipment appropriately (appropriate level of pressure on a well-calibrated and frequently maintained sprayer)

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AIB RECOMMENDATIONS

- Use the coarsest droplet size possible without compromising the efficacy
- Monitor weather and apply during favorable conditions (wind speeds 3 to 15 mph, temperatures <85.F, relative humidity >50%, no temperature inversions)
- Maintain at least a 25 ft spray buffer zone between the application area and surface water for ground applications and a 150 ft spray buffer zone for aerial applications
- Maintain a boom height no more than 4 ft above the canopy for ground applications and no more than 10 ft above the canopy for aerial applications
- Consider using drift retardants or spray additives within label guidance
- Consider using shielded sprayers if shields do not compromise uniform deposition
- Spray when wind direction is pointed away from non-target areas of concern, e.g. hives and pollinator habitat
- Use field buffers (i.e., beginning your application a certain distance from the edge of the field) as appropriate, especially if hives or plants that flower are close to the field being sprayed
- Mix and load pesticides away from waterbodies and ditches and use a designated spill containment surface. If a containment pad is unavailable, maintain a 25 ft distance from potential surface to groundwater conduits
- Be prepared for potential spills by developing and maintaining an incident response plan
- DO NOT pour leftover pesticide down a drain or in a single spot in a field

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AIB RECOMMENDATIONS

- Avoid applying during rain or when soil is saturated which favors runoff. Avoid foliar applications if rain is predicted in the next 24 or 48 hours
- Construct and maintain a vegetative filter strip at least 10 ft wide between the field edge and nearby down gradient aquatic habitat. Check product labels for exact width requirements, which may vary
- Maintain grass or vegetation buffers near tile outlets, in drainage ways, and along field boundaries
- Consider residue management practices such as adopting conservation tillage and planting a cover crop to help slow runoff
- Use the lowest labeled application rate that will effectively control the pest. Recommended application rates vary with the target pest species. Avoid applying below labeled rates which can compromise efficacy and favor the development of insecticide resistance
- Follow label restrictions for the maximum amount of clothianidin/imidacloprid allowed per acre, per application, per season, or per year. Pesticide applied as seed treatments counts toward maximum application rates
- Always follow all label directions and adopt proposed risks mitigation practices when possible
- Avoid applications during unusually low temperatures or when dew is forecast

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AIB RECOMMENDATIONS

- Leave a buffer strip of 2-3 feet between treated turf and the border of any landscape bed. This will minimize the potential for flowering ornamental roots to take up neonicotinoid insecticides
- Use perimeter trap crop treatments, refuge plantings, and other methods that prevent the entire field or population from being treated to help preserve susceptible individuals
- Time the application so that the most vulnerable insect life stage is exposed to the spray
- choose the least toxic neonicotinoid without compromising efficacy
- Change crops in a sequence to disrupt pest cycles

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AIB RECOMMENDATIONS

- Additional BMP recommendations AIB members would like to include in the rule from The Xerces Society:
  - Resistance management language including different modes of action in addition to different insecticide classes
  - Exempt drone applications from any aerial application restrictions or prohibitions because of drone application ability to apply in a precise manner reducing likelihood of drift off target
  - Increased communication among farmers, including land operators on leased land, and beekeepers with hives on premise: include communication from farmer/land operator to beekeeper as well as beekeeper to farmer/land operator
  - Rule should be accompanied by a more comprehensive guidance document that includes more specific examples and can adjust with new research learnings. Guidance document can include information on creating pollinator habitat

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AIB RECOMMENDATIONS

These recommendations are based on information gathered and presented to the Board. AIB members understand the legislative responsibility of the Agency of Agriculture, Food and Markets to adopt by rule BMPs for the use of neonicotinoid treated article seeds when used prior to the ban or under an exemption order and BMPs for the use of neonicotinoid pesticides when used prior to the ban, under exemption order, or when use is not otherwise prohibited.

AIB has reviewed the rule drafted by the Agency and is in agreement that it includes their recommendations and fulfills the legislative charge.

ADDITIONAL TOPICS

- Informed of policy discussions and legislative actions concerning perfluoroalkyl and polyfluoroalkyl substances
- Microplastics research in Vermont
- Agricultural pesticide applications by drone

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AGRICULTURAL INPUT SURVEY

- Polled participants of the Agricultural Pesticide Applicators Meeting (March 2024)
  - 55 responses, 10 counties
  - What environmental impacts are of concern when using agricultural inputs? (listed in order of most selected to least selected by participants)
    - Non-target pollinator exposure
    - Disposal of farm materials that are no longer useful (tires, ag plastic, pesticides, etc.)
    - Non-target beneficials exposure
    - Microplastics
    - PFAS
    - Non-target rodenticide exposure
  - What are the challenges to reducing use of ag inputs that cause environmental concern? (listed in order of most selected to least selected by participants)
    - Effectiveness of alternatives
    - Availability of alternatives
    - Cost of alternatives
    - Knowledge of alternatives

Neonicotinoid BMPs Available

Treated Seed BMPs

American Seed Trade Association (ASTA) – Crop Life America (CLA) The Guide to Seed Treatment Stewardship. ASTA_SeedGuide_Farmers_Update2021.pdf (seed-treatment-guide.com)

Health Canada, Pollinator Protection and Responsible Use of Insecticide Treated Seed. March 2015. treated_seed-semences_traitees-eng.pdf (canada.ca)

Health Canada, Protecting pollinators when using treated seed - best management practices. Amended version - May 2023. Protecting pollinators when using treated seed - best management practices

Ontario Environment & Energy, Best management practices when using insecticide treated seed

Honey Bee Health Coalition, Best Management Practices (BMPs) for Pollinator Protection in Field Corn. February 2020. HBHC_Corn_022020.pdf (honeybeehealthcoalition.org)

Honey Bee Health Coalition, Best Management Practices (BMPs) to Protect Honey Bees and Other Pollinators in Soybean Fields. February 2020. HBHC_Soybean_022020.pdf (honeybeehealthcoalition.org)

Minnesota Department of Agriculture, Stewardship Guidelines and Best Management Practices for Neonicotinoid Insecticide-Treated Seed. May 2019. Stewardship Guidelines and Best Management Pracitces for Neonicotinoid Insecticide-Treated Seed (state.mn.us)

Minnesota Pollution Control Agency, Disposal of Treated Seeds. April 2022. Treated Seeds (state.mn.us)

Stoner, K. Connecticut Agricultural Experiment Station. Best Management Practices for Farmers Using Seeds Treated with Neonicotinoid Insecticides. BMPHandlingNeonicotinoidTreatedSeedspdf.pdf (ct.gov)

Corn Dust Research Consortium (CDRC), Executive Summary & Recommendations. July 2017. CDRC-Executive-Summary-October-2017.pdf (pollinator.org)

General Neonicotinoid BMPs

Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)

Minnesota Department of Agriculture, Stewardship Guidelines and Best Management Practices for Home and Residential Use of Neonicotinoid Pesticides. May 2019. Home and Residential Use of Neonicotinoid Insecticides (state.mn.us)

Minnesota Department of Agriculture, Stewardship Guidelines and Best Management Practices for Use of Soil and Foliar-applied Agricultural Neonicotinoid Insecticides. July 2019. Soil and Foliar Neonicotinoid Guide (state.mn.us)

Best Management Practices for Vermont Golf Courses, second edition. 2022. vermont-bmps.pdf (gcsaa.org)

National Association of Landscape Professionals Turf & Ornamental Best Management Practices for Pollinator Protection. 2020. NALP_Pollinator_BMPs_FINAL.pdf (pesticidestewardship.org)

Honey Bee Health Coalition, Best Management Practices (BMPs) for Pollinator Protection in Field Corn. February 2020. HBHC_Corn_022020.pdf (honeybeehealthcoalition.org)

Honey Bee Health Coalition, Best Management Practices (BMPs) to Protect Honey Bees and Other Pollinators in Soybean Fields. February 2020. HBHC_Soybean_022020.pdf (honeybeehealthcoalition.org)

Pollinator Partnership, Wojcik, Davies Adams, and Rourke, Securing Pollinator Health and Crop Protection Communication and Adoption of Farm Management Techniques in Four Crops. Microsoft Word - Securing Pollinator Health and Crop Protection - FINAL 05 26 14-chemigation addition.docx (pesticidestewardship.org)

Walgenbach, J. North Carolina State University Extension Entomologist. Pollinator Protection in Apples. Pollinator-Protection-in-Apples_Walgenbach.pdf (pesticidestewardship.org)

Honey Bee Health Coalition, Apple Best Management Practices. USApple-Pollinator-BMPs-Final.pdf (honeybeehealthcoalition.org)

Cornell University, A Guide to Reducing Pesticide Risk to Bees in Tree fruit Orchards. 2023. Pesticide Decision Guide - 2023 - Orchards.pdf | Powered by Box

Cornell University, A Pesticide Decision Making Guide to Protect Pollinators in Landscape, Ornamental, and Turf Management. 2019. Pesticide Decision Guide - 2019 - Landscape, Ornamentals, Turf.pdf | Powered by Box

Cornell University, A Guide to Reducing Pesticide Risk to Bees in Small Fruit, Grapes and Hops in New York. 2023. Pesticide Decision Guide - 2023 - Small Fruit, Grapes, Hops.pdf | Powered by Box

Cornell University, A Guide to Reducing Pesticide Risk to Bees in Vegetable Agriculture and Field Crops in New York. 2023. Pesticide Decision Guide - 2023 - Field Crops.pdf | Powered by Box

North Central IPM Center, Best Management Practices for Turf Care and Pollinator Conservation. 2019. BMP-for-Pollinators-and-Turf-NCIPM.pdf (pesticidestewardship.org)

Horticultural Research Institute, Best Management Practices (BMPs) for Bee Health in the Horticultural Industry. 2017. HRtor-BMPs-January2017.pdf (multiscreensite.com)

Purdue University Extension, Protection Pollinators in Home Lawns and Landscapes. 2016. Tips for Protecting Pollinators in Home Lawns and Landscapes (purdue.edu)

BMP Type	Best Practice	Sources
IPM	Use cultural, physical, and biological controls and select insect resistant/tolerant crop varieties to avoid or reduce pest risk.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) , Turf & Ornamental Best Management Practices for Pollinator Protection, NE Vegetable Management Guide 2024
IPM	Scout fields regularly and use economic thresholds to help determine if, when, and where to apply	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) , Best Management Practices for Vermont Golf CoursesBest Management Practices for Vermont Golf Courses, second edition. 2022. vermont-bmps.pdf (gcsaa.org) , Turf & Ornamental Best Management Practices for Pollinator Protection, NE Vegetable Management Guide 2024
IPM	Use hot-spot spraying and banding where appropriate to reduce the amount of pesticide applied.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
IPM	Rotate clothianidin and imidacloprid with other insecticides with different mode of action, such as synthetic pyrethroids, organophosphates, and insect growth regulators that are known to be effective.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) , NE Vegetable Management Guide 2024
IPM	Avoid a sequential foliar application of clothianidin/imidacloprid following a seed, soil, or foliar application of clothianidin/imidacloprid.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
IPM	Consider using precision application technology (e.g., auto-steer, auto-boom shutoff, and variable rate sprayer) to avoid overspray, spray overlap, and higher than recommended application rates.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
IPM, Pollinator Protection	Avoid using pesticides or tank mixing pesticides and adjuvants that are known to synergize with each other creating a higher risk to pollinators.	Cornell University, A Guide to Reducing Pesticide Risk to Bees in Tree fruit Orchards. 2023. Pesticide Decision Guide - 2023 - Orchards.pdf , Cornell University, A Pesticide Decision Making Guide to Protect Pollinators in Landscape, Ornamental, and Turf Management. 2019.
IPM	Use spot sprays, perimeter trap crop treatments, refuge plantings, and other methods that prevent the entire field or population from being treated to help preserve susceptible individuals.	NE Vegetable Management Guide 2024
IPM, Pollinator Protection	Time the application so that the most vulnerable insect life stage is exposed to the spray.	NE Vegetable Management Guide 2024

BMP Type	Best Practice	Sources
IPM, Off Target Movement	Use equipment appropriately (appropriate level of pressure on a well-calibrated and frequently maintained sprayer).	Minnesota Department of Agriculture, Stewardship Guidelines and Best Management Practices for Use of Soil and Foliar-applied Agricultural Neonicotinoid Insecticides. July 2019. Soil and Foliar Neonicotinoid Guide (state.mn.us) , Honey Bee Health Coalition, Best Management Practices (BMPs) for Pollinator Protection in Field Corn. February 2020. HBHC_Corn_022020.pdf (honeybeehealthcoalition.org) , Best Management Practices for Vermont Golf CoursesBest Management Practices for Vermont Golf Courses, second edition. 2022. vermont-bmps.pdf (gcsaa.org)
Off Target Movement	Select nozzles that produce medium or coarser droplet sizes (200-400 microns, ASABE S572.l). Use the coarsest droplet size possible without compromising the efficacy.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) , Honey Bee Health Coalition, Best Management Practices (BMPs) for Pollinator Protection in Field
Off Target Movement, Pollinator Protection	Monitor weather and apply during favorable conditions (wind speeds 3 to 15 mph, temperatures <85.F, relative humidity >50%, no temperature inversions, at night if necessary)	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) , Walgenbach, J. North Carolina State University Extension Entomologist. Pollinator Protection in Apples. Pollinator-Protection-in-Apples_Walgenbach.pdf (pesticidestewardship.org)
Off Target Movement	Maintain at least a 25 ft spray buffer zone between the application area and surface water for ground applications and a 150 ft spray buffer zone for aerial applications.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Off Target Movement	Maintain a boom height no more than 4 ft above the canopy for ground applications and no more than 10 ft above the canopy for aerial applications.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Off Target Movement	Consider using drift retardants or spray additives within label guidance.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) , Honey Bee Health Coalition, Best Management Practices (BMPs) for Pollinator Protection in Field Corn. February 2020. HBHC_Corn_022020.pdf (honeybeehealthcoalition.org)
Off Target Movement	Consider using shielded sprayers if shields do not compromise uniform deposition.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) ,
Off Target Movement, Pollinator Protection	Spray when wind direction is pointed away from non-target areas of concern, e.g. hives and pollinator habitat.	Honey Bee Health Coalition, Best Management Practices (BMPs) for Pollinator Protection in Field Corn. February 2020. HBHC_Corn_022020.pdf (honeybeehealthcoalition.org) , Honey Bee Health Coalition, Apple Best Management Practices. USApple-Pollinator-BMPs-Final.pdf (honeybeehealthcoalition.org) , Honey Bee Health Coalition, Best Management Practices (BMPs) to Protect Honey Bees and Other Pollinators in Soybean Fields. February 2020. HBHC_Soybean_022020.pdf (honeybeehealthcoalition.org)
Off Target Movement, Pollinator Protection	Use field buffers (i.e., beginning your application a certain distance from the edge of the field) as appropriate, especially if hives or plants that flower are close to the field being sprayed.	Honey Bee Health Coalition, Best Management Practices (BMPs) for Pollinator Protection in Field Corn. February 2020. HBHC_Corn_022020.pdf (honeybeehealthcoalition.org)
Off Target Movement	Be Aware of Temperature Inversions	Minnesota Department of Agriculture, Stewardship Guidelines and Best Management Practices for Use of Soil and Foliar-applied Agricultural Neonicotinoid Insecticides. July 2019. Soil and Foliar Neonicotinoid Guide (state.mn.us)

BMP Type	Best Practice	Sources
Off Target Movement	Mix and load pesticides away from waterbodies and ditches and use a designated spill containment surface. If a containment pad is unavailable, maintain a 25 ft distance from potential surface to groundwater conduits.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Off Target Movement	Be prepared for potential spills by developing and maintaining an incident response plan.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Off Target Movement	DO NOT pour leftover pesticide down a drain or in a single spot in a field.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Off Target Movement	Avoid applying during rain or when soil is saturated which favors runoff. Avoid foliar applications if rain is predicted in the next 24 or 48 hours.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Off Target Movement, Label	Construct and maintain a vegetative filter strip at least 10 ft wide between the field edge and nearby down gradient aquatic habitat. Check product labels for exact width requirements, which may vary.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Off Target Movement	Maintain grass or vegetation buffers near tile outlets, in drainage ways, and along field boundaries.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Off Target Movement	Consider residue management practices such as adopting conservation tillage and planting a cover crop to help slow runoff.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Off Target Movement	Avoid practices that lead to soil compaction {e.g., tillage of wet soil) and, in turn, increase runoff.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Off Target Movement	Use soil moisture monitoring techniques, such as sensors, to avoid over-irrigation and runoff.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Label, IPM	Use the lowest labeled application rate that will effectively control the pest. Recommended application rates vary with the target pest species. Avoid applying below labeled rates which can compromise efficacy and favor the development of insecticide resistance.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Label	Follow label restrictions for the maximum amount of clothianidin/imidacloprid allowed per acre, per application, per season, or per year. Pesticide applied as seed treatments counts toward maximum application rates.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Label, IPM	Always follow all label directions and adopt proposed risks mitigation practices when possible.	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net)
Pollinator Protection	Mow the area immediately before application to remove blossoms from flowering weeds or use herbicides to reduce weed populations	Best Management Practices for Vermont Golf CoursesBest Management Practices for Vermont Golf Courses, second edition. 2022. vermont-bmps.pdf (gcsaa.org)

BMP Type	Best Practice	Sources
Pollinator Protection	If possible, select a pesticide with lowest toxicity to pollinators	Minnesota Department of Agriculture, Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid. March 2023. Water Quality Best Management Practices for Agricultural Use of Clothianidin and Imidacloprid | WRL Digital Asset Management (mnpals.net) , Best Management Practices for Vermont Golf CoursesBest Management Practices for Vermont Golf Courses, second edition. 2022. vermont-bmps.pdf (gcsaa.org) , Turf & Ornamental Best Management Practices for Pollinator Protection, Walgenbach, J. North Carolina State University Extension Entomologist. Pollinator Protection in Apples. Pollinator-Protection-in-Apples_Walgenbach.pdf (pesticidestewardship.org) , Honey Bee Health Coalition, Best Management Practices (BMPs) to Protect Honey Bees and Other Pollinators in Soybean Fields. February 2020. HBHC_Soybean_022020.pdf (honeybeehealthcoalition.org) , Honey Bee Health Coalition, Apple Best Management Practices. USApple-Pollinator-BMPs-Final.pdf (honeybeehealthcoalition.org)
Pollinator Protection	Avoid applications during unusually low temperatures or when dew is forecast	Best Management Practices for Vermont Golf CoursesBest Management Practices for Vermont Golf Courses, second edition. 2022. vermont-bmps.pdf (gcsaa.org)
Pollinator Protection	Leave a buffer strip of 2-3 feet between treated turf and the border of any landscape bed. This will minimize the potential for flowering ornamental roots to take up neonicotinoid insecticides	Purdue University Extension, Protection Pollinators in Home Lawns and Landscapes. 2016. Tips for Protecting Pollinators in Home Lawns and Landscapes (purdue.edu)