

AGRICULTURAL INNOVATION BOARD RECOMMENDATIONS REGARDING BEST MANAGEMENT PRACTICES  
(BMPs) FOR NEONICOTINOID TREATED ARTICLE SEEDS

2022 Act No 49, codified at 6 V.S.A. § 1105a (c)

Submitted to the:

Secretary of Agency of Agriculture, Food and Markets

By the:

Agricultural Innovation Board

January 2, 2024

6 V.S.A. § 1105a (c) (1)-(2) Treated articles; powers of Secretary; best management practices

(c)(1) Under subsection (a) of this section, the Secretary of Agriculture, Food and Markets, after consultation with the Agricultural Innovation Board, shall adopt by rule BMPs for the use in the State of neonicotinoid treated article seeds. 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;
- (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 are used;
- (D) relative toxicities of different neonicotinoid treated article seeds and the effects of neonicotinoid treated article seeds 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.

(2) In implementing the rules required under this subsection, the Secretary of Agriculture, Food and Markets shall work with farmers, seed companies, and other relevant parties to ensure that farmers have access to appropriate varieties and amounts of untreated seed or treated seed that are not neonicotinoid treated article seeds.

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## Introduction

The Agricultural Innovation Board (the Board or AIB) is an independent group of interested parties created by Legislature in 2021. The members are charged to use their diverse set of experience and knowledge to review, explore, and make recommendations on pest management practices and policy in Vermont.

Throughout 2022 and 2023, the AIB addressed its responsibility to develop a policy recommendation for the use of neonicotinoid treated article seeds by hearing from expert witnesses and obtaining information relevant to the required topics outlined in 6 V.S.A § 1105a. The presentations made to the Board available on the AIB Website ([Meeting Information | Agency of Agriculture Food and Markets \(vermont.gov\)](https://meetinginformation.vermont.gov)).

The Board met 17 times since February 2022 and members reviewed relevant literature and research on their own between meetings. The Board invited researchers, industry representatives, agricultural service providers, and subject matter experts to present their findings and answer questions from the Board to inform their recommendation for best management practices for the use of neonicotinoid treated seeds in Vermont. Each of the following topics were addressed:

- (A) Establishment of threshold levels of pest pressure required prior to use of neonicotinoid treated article seeds
- (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 are used
- (D) Relative toxicities of different neonicotinoid treated article seeds and the effects of neonicotinoid treated article seeds 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
- (G) Criteria for a system of approval of neonicotinoid treated article seeds

## Key Takeaways by Topic

AIB members worked together after hearing from 14 external subject matter experts and presentations from six Board members and/or Agency staff to summarize what they had learned and if there were any gaps or outlying questions to address. The following points were agreed upon by all members as the summary of what members heard relevant to each required topic included in 6 V.S.A. § 1105a. The bold-faced headings align with the statutory charge enumerated in 6 V.S.A. § 1105a(c)(1).

- (A) Establishment of threshold levels of pest pressure required prior to use of neonicotinoid treated article seeds**
- (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). Therefore, scouting the field for pests in the current year cannot influence what type of seeds to purchase and plant. Also, the previous year’s pest pressure levels are not a clear indicator of pest levels in the current year.

- Few methods are available for scouting for corn seed maggot and no economic thresholds are established for this pest.
- It is very challenging to monitor soil pests to determine if threshold values are exceeded within the window of time prior to planting in Vermont.
- 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 crop damage.
  - 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 damage 7-30 days from planting, and there is no insecticide rescue treatment.
- Wireworm bait traps within field help scout for pest and have an established economic threshold of an average of 1 wireworm per bait station for the whole field.
  - Ideally scouting should be done in fall when temperatures are above 45°F.
- The use of genetically engineered (GE) corn seed to reduce corn borer has reduced overall population of corn borer moth, which is well documented in the literature. The use of this technology has benefited farms that do not use GE corn because of overall population reduction.
- Relevant AIB meeting presentations and discussions
  - 3/27/2023  
[Vermont Corn and Soybean Pest Pressures, IPM and Neonicotinoid Treated Seed Research and Availability - Dr. Heather Darby, UVM Extension](#)
  - 6/26/2023  
[Seed Corn Maggot, Stand Losses and the Need for Insecticide Seed Treatments - Elson Shields, Cornell University](#)
  - 7/24/2023  
[Neonicotinoid Treated Seed and IPM in PA - Dr. John Tooker, Professor of Entomology / State IPM Coordinator, Penn State College of Agricultural Sciences](#)
  - 8/28/2023  
Stoner, K. [Best Management Practices for Farmers Using Seeds Treated With Neonicotinoid Insecticides](#), Connecticut Department of Agriculture online publication

**(B) Availability of nontreated article seeds that are not neonicotinoid treated article seeds**

- There is limited availability of untreated corn seed, and there are limited untreated varieties and maturities offered.
- Untreated seed orders add complexity to seed demand planning for the seed industry and therefore orders for untreated seed must be made even earlier.
  - Untreated seed must be ordered in Sept/Oct for the next planting season. However, the ability to switch maturities, hybrid varieties or from grain to silage closer to the planting season depending on conditions adds extreme complexity for the seed industry.
    - It is relatively common for farmers to need to switch maturities or hybrids depending on growing season conditions.
    - That flexibility is not available when a farmer purchases untreated seeds.

- Adding a fungicide-only or non-neonic treated seed option would create exponential complexity within the seed industry since seed production is a multistep and multiyear process.
  - GE technologies require the application of an insecticide to protect industry traits, therefore some trait seeds would not be available in a fungicide-only treatment.
- 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 would make it more difficult for farmers to adapt to climate change.
- Untreated soybean seed is slightly more common with higher sales in VT.
  - Soybean is more likely to be treated downstream by an in-state seed dealer who is certified to apply a pesticide to the seed.
- Planting a seed without insecticide treatment is considered a liability.
  - Crop insurance premiums could increase because of the increase in perceived risk to the crop.
- Fungicide-only treated seeds are difficult to obtain.
- There are no price savings for untreated seeds.
- Diamide (neonicotinoid alternative) treated seeds are available and commonly/exclusively used in Canada because of regulations.
  - Diamide treated seeds are more expensive than neonicotinoid treated seeds
  - Diamide's relative toxicity to bees is less than neonicotinoids, but toxicity to aquatic invertebrates is similar
  - i.e. Fortenza (cyantraniliprole) registered in 2015
  - i.e. Lumivia (chlorantraniliprole) registered in 2016
- Cimegra is an alternative insecticide (active ingredient broflanilide) that is recently available as in-furrow treatment for soil insects in field crops.
  - 20-26 days after plant protection
  - The majority of planters used do not have the capability to make this type of application since the introduction of treated seed.
  - This insecticide has toxicity to bees similar to the neonicotinoids.
- Relevant AIB meeting presentations and discussions
  - 1/23/2023  
[Seed Sales in VT Update - Vermont Agency of Agriculture, Food and Markets](#)
  - 2/27/2023  
[Update on 2022 Treated and Untreated Seed Reporting - Vermont Agency of Agriculture, Food and Markets](#)
  - 3/27/2023  
[Vermont Corn and Soybean Pest Pressures, IPM and Neonicotinoid Treated Seed Research and Availability - Dr. Heather Darby, UVM Extension](#)
  - 4/24/2023  
[2022 Seed Report Update - Jill Goss, Vermont Agency of Agriculture, Food and Markets](#)
  - 6/26/2023  
Treated Seed Availability and Sales Logistics (Corteva Agriscience) – [meeting minutes](#)
  - 6/26/2023  
[Ontario Neonicotinoid Treated Seed Regulations and Related Research - Tracey Baute, Ontario Ministry of Agriculture, Food and Rural Affairs](#)

**(C) Economic impact from crop loss as compared to crop yield when neonicotinoid treated article seeds 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 is evident from the sources reviewed.
- Smith, Baute, Schaafsma, 2020 Ontario study found a significant difference in “vigor” with neonicotinoid treated corn seed compared to fungicide only, but did not translate to a significant yield increase.
  - Chance of cost recovery of neonicotinoid treated seed use occurred in < 50% of study sites
  - Early season soil insect pests were not uncommon
  - Poor relationship between insect incidence and yield loss
  - Early season insect pests found in Ontario are generally minor, causing sub-economic injury
- Shields 2022 research at Cornell University showed the assumed cost of yield loss seen in research plots planted with corn seed without insecticide exceeded the cost of the corn seed maggot seed treatment (the yield loss is greater than the cost of the treatment). It makes sense for farmers to use the seed treatment as an insurance policy because there is no additional cost to the farmer to use.
  - When corn seed maggot is a problem in the field the losses are catastrophic, resulting in having to replant
- There would not be an immediate increase in insurance premiums if growers choose to plant non-neonic treated seeds, however, if there is a change to growers’ choices that leads to consistent increases in losses then there may be increases in premiums in future years with a demonstrated loss.
  - An increase in premiums has a regional effect
- There is opportunity to learn economic impacts of using untreated seed and planting later in the season to avoid peak pest pressures.
  - A shorter maturity (approx. 75-day) silage corn exists, but it may not be what VT farmers need or want for optimal feed production.
- Relevant AIB meeting presentations and discussions
  - 6/26/2023 [Efficacy and Economic Benefits of Neonicotinoid Seed Treatments - Christine Hazel, Corteva Agriscience](#)
  - 6/26/2023 [Seed Corn Maggot, Stand Losses and the Need for Insecticide Seed Treatments - Elson Shields, Cornell University](#)
  - 6/26/2023 [Ontario Neonicotinoid Treated Seed Regulations and Related Research - Tracey Baute, Ontario Ministry of Agriculture, Food and Rural Affairs](#)

- 8/28/2023  
[Neonicotinoids in NY State: Economic Benefits and Risks to Pollinators - Dr. Scott McArt, Associate Professor of pollinator health, Department of Entomology, Cornell University](#)
- 9/25/2023  
UVM Neonicotinoid Treated Seed Research Update – Dr. Heather Darby, UVM Extension – [meeting minutes](#)
- 11/13/2023  
Potential impact of non-neonicotinoid treated seeds to crop insurance discussion – Alexander Sereno, Regional Director USDA Risk Management Agency – [meeting minutes](#)

**(D) Relative toxicities of different neonicotinoid treated article seeds and the effects of neonicotinoid treated article seeds on human health and the environment**

- Review of EPA human health risk assessment for imidacloprid
  - Residue on food crop from neonicotinoid seed treatment use is negligible; therefore, food crops grown from treated seeds are unlikely to present a health risk.
  - Very little risk for exposure to the farmer when seed is purchased already treated
  - Neonicotinoids have favorable human health profile compared to the organophosphate insecticides they replaced.
- Review of EPA ecological risk assessment of neonicotinoid
  - Most likely risk of concern for mammals and birds is from chronic consumption of treated seed
  - 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
  - Proposed mitigation measures relevant to treated seed include proposal of additional seed bag label language
    - “Cover or collect treated seeds spilled during loading and planting in areas (such as in row ends).”
    - “Dispose of all excess treated seed by burying seed away from bodies of water.”
    - “Do not contaminate bodies of water when disposing of planting equipment wash water.”
  - EPA stated “These risk mitigation measures were considered with the understanding of the high benefits associated with seed treatment uses, which through their use, have the potential to reduce overall neonicotinoid exposure and offer a lower overall ecological risk compared to foliar uses.”
- Neonicotinoids are highly water soluble and persist in the soil.
- Fate and transport of neonicotinoids on the treated seed
  - 2-20% taken up by the target plants (protect from soil pests for up to 3 weeks)
  - 2-3% lost as dust during planting
  - > 90% moves into soil, water, non-target plants
- 1-3% of the acreage treated with a neonicotinoid (clothianidin or thiamethoxam) is treated by foliar or in-furrow treatments, the remainder is through seed treatments.



- The amount of active ingredient per seed is considerably less than in-furrow treatments.
- Seed treatment is considered an Integrated Pest Management (IPM) strategy by the seed industry because of lower usage rates and targeted treatment to the seed.
- 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.
  - Resulting 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 or graphite, but a dust-reducing fluency agent was available at the local dealer.
- Sources of neonicotinoid exposures to non-target species come from:
  - Exhausted dust from vacuum planters
  - Farmers treating their own seed.
  - 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
- Current UVM studies by Heather Darby are looking at the impact of neonicotinoid treated seeds on plant stands and pest populations. They are monitoring soil and surface water runoff for neonicotinoid levels.
  - Pest levels were low overall across both neonicotinoid treated seed and fungicide only treated seed treatments.
  - Still collecting yield data, but no significant differences across treatments to date and little to no pest incidence data.
  - Only one year of a two-year study has been completed.
- Relevant AIB meeting presentations and discussions
  - 5/23/2022  
[Pollinator Protection Efforts in VT – Dr. Terence Bradshaw, Assistant Professor, Plant & Soil Science, UVM](#)
  - 3/27/2023  
[Environmental Impact of Neonicotinoid Treated Seeds Literature Review - Vermont Agency of Agriculture, Food and Markets](#)
  - 3/27/23  
[Environmental Impact of Neonicotinoid Treated Seed Annotated Bibliography](#)
  - 3/27/2023  
Literature review of risk assessment of neonicotinoid treated seeds on human health – Sarah Owen, Toxicologist, Vermont Department of Health – [meeting minutes](#)

- 4/24/23  
[Impact of Neonicotinoid Treated Seed on Pollinator Health - Andrew Munkres, Vermont Beekeepers Association](#)
- 4/24/23  
[Summary EPA Neonicotinoid Ecological Risk Assessment - Morgan Griffith, Vermont Agency of Agriculture, Food and Markets](#)
- 5/22/23  
[Review of Treated Seed Dust-Off Research - Jill Goss, Vermont Agency of Agriculture, Food and Markets](#)
- 5/22/23  
[Dr. Schaafsma Planter Modifications Resources and Summary - Jill Goss, Vermont Agency of Agriculture, Food and Markets](#)
- 6/26/2023  
[Natural Resources Defense Council Public Comment and References - Lucas Rhoads, Natural Resources Defense Council](#)
- 7/24/2023  
[Neonicotinoid Treated Seed and IPM in PA - Dr. John Tooker, Professor of Entomology / State IPM Coordinator, Penn State College of Agricultural Sciences](#)
- 8/28/23  
[Neonicotinoids in NY State: Economic Benefits and Risks to Pollinators - Dr. Scott McArt, Associate Professor of pollinator health, Department of Entomology, Cornell University](#)
- 9/25/2023  
UVM Neonicotinoid Treated Seed Research Update – Dr. Heather Darby, UVM Extension – [meeting minutes](#)

**(F) Ways to reduce pest harborage from conservation tillage 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 conservation tillage practices are less attractive to corn seed maggot because organic matter isn't exposed
  - Corn seed maggot populations are generally higher after a legume crop is incorporated into the soil than where grass is incorporated
  - Greatest wireworm damage occurs in crops planted in fields following grass sod
- No-till practices provide habitat for beneficial organisms and increased predator populations decreases pest problems (supported by Penn State research and widespread practice amongst PA growers)
- There is a relationship between type of tillage practice and resulting pest pressures.
  - The situation is complex in VT because manure and cover crop incorporation are common and recommended practices.
  - More research is needed on this relationship in Vermont.
- Relevant AIB meeting presentations and discussions

- 3/27/2023  
Vermont Corn and Soybean Pest Pressures, IPM and Neonicotinoid Treated Seed Research and Availability - Dr. Heather Darby, UVM Extension – [meeting minutes](#)
- 7/24/2023  
[Neonicotinoid Treated Seed and IPM in PA - Dr. John Tooker, Professor of Entomology / State IPM Coordinator, Penn State College of Agricultural Sciences](#)

**(G) Criteria for a system of approval of neonicotinoid treated article seeds**

- Canada has federal-level prohibition of talc and graphite as seed lubricants to reduce the risk of neonicotinoid seed treatments abrading off of the seeds during planting.
  - Published [Best Management Practices for Protecting Pollinators When Using Treated Seed](#)
  - [Requirement when using Treated Corn/Soybean Seed](#)
- Ontario
  - Provincial 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
    - Saw 35% reduction in neonic treated corn by 2018, 43% reduction in neonic treated soybean planted in Ontario by 2018 (based on vendor sales reports sent to MECP)
    - Ontario yields for corn and soybean did not see significant changes 2015-2022
    - Neonicotinoid treated seed is still being used on a portion of the planted acreage
- Quebec
  - Requirements placed on farmers to obtain agronomic justification and prescription from certified agronomist following an agronomic assessment.
    - Assess soil type, geographic region, organic matter, tillage practices, crop rotation, pest pressure and assign low, moderate or high risk. Neonicotinoid seed treatments are only justified on farms assessed as high risk.
    - Prescription only valid 1 year
  - Requirements are burdensome have a high impact on resources (growers, government and agronomists) resulting in dramatic reduction of use of neonicotinoid treated seeds.
  - Neonicotinoid treated corn seed use in Quebec has dropped to 0.5% by 2021 (from 100% in 2015)
  - Transitioned to diamide treated seed
- New York passed the Birds and Bees bill in 2023. Prohibits the sale, distribution or purchase of corn, soybean or wheat seeds treated with clothianidin, imidacloprid, thiamethoxam, dinotefuran or acetamiprid starting January 1, 2027, but it appears it will be revised to 2029 following an agreement with the Governor.

- Authorizes the commissioner, after consultation with the commissioner of agriculture and markets, to temporarily suspend the prohibition if there is an insufficient amount of commercially available seed to adequately supply ag market that is not treated with neonics, or if purchase of seed that complies with these requirements would result in undue financial hardship to ag producers.
- By Oct 1 each year the commissioner shall publish written directive as to whether there is a temporary suspension for the forthcoming year.
- Prohibition shall not apply when commissioner determines there is an environmental emergency and no less harmful pesticide would be effective.
- NY Department of Environmental Conservation shall conduct study with NY Department of Agriculture and Markets, New York state's land grant university and State University of New York College of Environmental Science and Forestry, to identify practicable and feasible alternatives to neonics and submit results of study to legislature and governor and post online by Jan 1, 2026.
- Relevant AIB meeting presentations and discussions
  - 5/22/23  
[Review of State Neonicotinoid Use Laws and Regulations - Gene Harrington, Biotechnology Innovation Organization](#)
  - [State Neonic Laws & Regs Summary Table – AIB Sharepoint](#)
  - 6/26/23  
[Ontario Neonicotinoid Treated Seed Regulations and Related Research - Tracey Baute, Ontario Ministry of Agriculture, Food and Rural Affairs](#)
  - 7/24/23  
[A Perspective on Provincial Regulatory Approaches to Neonicotinoid Seed Treatments - Émilie Bergeron, Vice President Chemistry, CropLife Canada](#)
  - 7/24/23  
[Overview of Health Canada's Pest Management Regulatory Agency Neonicotinoid Regulations - Morgan Griffith, Vermont Agency of Agriculture, Food & Markets](#)

## AIB Recommendations

In the current seed market, neonicotinoid treated seeds are an inexpensive form of insurance, and alternative options are very limited for farmers. Because of the unavailability of non-neonicotinoid treated seeds within Vermont that allow for the necessary flexibility of variety choice and exchanging seed to adjust for planting conditions closer to planting time, the Board's recommendations focus on research and education. The Board recommends actions to further understand the issues within Vermont, help educate growers about practices to limit pest pressure or reduce non-target exposure, and promote ongoing or planned research. Board members unanimously supported efforts to increase pollinator habitat without impacting agricultural production. There is some member support for monetary programs to mitigate any potential losses from use of non-neonicotinoid treated seeds, although evaluation of total pesticide exposure should be considered for monetary programs to support food crop use of non-neonicotinoid treated seed.

These recommendations are based on information gathered and presented to the Board. AIB members understand the toxicity of neonicotinoid insecticides on non-target insects and organisms up the trophic

ladder. The Board understands the potential risk for pollinator exposure, and exposure to small mammals, birds, and amphibians, from the use of neonicotinoid treated seeds. In addition, the Board understands that previous research evaluating the impact on corn yield of neonicotinoid treated seeds compared to non-neonicotinoid treated seeds has found inconsistent and/or no significant differences in yield. However, it is unknown how past use of neonicotinoid treated seed has affected the pest populations and pressures throughout agriculture. This halo, or legacy effect, is not well understood and has the potential to influence research studies and therefore should be evaluated.

AIB members reached consensus on the following recommendations:

1. Support additional research:
  - a. Study the impact of halo or legacy effect on pest populations from the almost universal use of neonicotinoid treated seeds since 1990
  - b. Non-target dust movement with new seed treatment technology that reduces abrasion of seed treatment during handling and planting
  - c. Effectiveness, unknown limitations, and market availability of seed lubricant alternatives to talc and graphite
  - d. Impact of managing/mowing buffers at planting time of treated seeds
    - i. Reducing pollinator habitat in areas at risk of exposure from planting treated seeds may conflict with other conservation programs or not be feasible for farms
  - e. Support research and development of neonicotinoid alternatives and sustainable crop protection strategies specifically tailored to Vermont agricultural landscapes
2. Education and training
  - a. Develop IPM guidance for growers for how to reduce environmental impact of neonicotinoid treated seeds
    - i. Develop information (in collaboration with University of Vermont) on toxicity and potential risk to pollinators decision making, scouting, types of pests, and management practices
    - ii. Develop regional monitoring reports that track the prevalence of pests
  - b. Ensure growers receive updates on relevant research through workshops (developed in collaboration with UVM)
    - i. Seed treatment technology innovations to reduce dust/abrasion
    - ii. Seed lubricant alternatives
    - iii. Impact of past use of neonicotinoid treated seeds on present pest populations
    - iv. Local data on feasibility of VT corn crops without neonicotinoid seed treatment (plant stand, yield, economic impact, cultural pest management practices)
  - c. Educate growers about seed label language and how to follow the label
3. Support and promote efforts to increase pollinator habitat without impacting agricultural production.
4. Important to build in a mechanism for review and reevaluation of recommendations, so guidelines can adjust to incorporate knowledge from research.
  - a. Revisit policy recommendations after a defined period of time and evaluate based on measurable metrics

## AIB Members

**Wendy Sue Harper, Ph.D.** - Soil Scientist, Retired Associate Faculty, Prescott College [AIB Role Fulfillment: Soil Biologist]

**Clara Ayer** - Dairy Farmer, Fairmont Farm [AIB Role Fulfillment: an active farmer who is a member of an organization representing the conventional dairy industry in Vermont]  
Appointment concluded April 11, 2023

**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]

**Terence Bradshaw, Ph.D.** - Assistant Professor, Department of Plant and Soil Science / Director, Horticultural Research and Education Center, UVM [AIB Role Fulfillment: an active farmer who is a member of an organization representing fruit and vegetable farmers in Vermont]  
Appointment concluded July 1, 2023

**Ann Hazelrigg, Ph.D.** - Extension Associate Professor, Department of Plant and Soil Science / Director, Plant Diagnostic Clinic, UVM [AIB Role Fulfillment: an active farmer who is a member of an organization representing fruit and vegetable farmers in Vermont]  
Appointment commenced July 1, 2023

**Jonathan Chamberlin** - Ag Retail/Crop Consultant, Bourdeau Brothers [AIB Role Fulfillment: a certified crop consultant]

**Clarice Cutler** - Environmental Analyst, Department of Environmental Conservation, Agency of Natural Resources [AIB Role Fulfillment: the Secretary of Natural Resources or designee]  
Appointment concluded October 11, 2023

**Abbi Pajak** - Environmental Analyst, Department of Environmental Conservation, Agency of Natural Resources [AIB Role Fulfillment: the Secretary of Natural Resources or designee]  
Appointment commenced November 6, 2023

**Earl Ransom** - Organic Dairy Farmer, Rockbottom 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]

**Sarah Owen, Ph.D.** - State Toxicologist, 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]