

## **AGRICULTURAL INNOVATION BOARD**

### **Neonicotinoid Treated Seed Information**

updated 10/16/2023

The following document outlines key takeaways from information presented to the Agricultural Innovation Board (AIB) relevant to neonicotinoid treated seeds. The AIB invited researchers, industry representatives, 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**

- (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**

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](#)

- 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.
- Very challenging to monitor for 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 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, 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 above 45F
- GMO to reduce corn borer has reduced overall population of corn borer moth (well documented in literature) so use of GMO has benefited farms that don't use GMO corn because of overall population reduction.

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

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](#)

- Limited availability of untreated corn seed, and there are limited untreated varieties and maturities offered.
- Untreated seed orders adds 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 of the previous year. 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.
    - More times than not farmers are looking to switch maturities or hybrids depending on how the growing season is closer to planting time
    - That flexibility is not available for untreated seeds

- Adding a fungicide-only or non-neonic treated seed option would create exponential complexity within seed industry since seed production is a multistep and multiyear process
- 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.
- Untreated soybean seed is slightly more common with higher sales in VT
  - Soybean is more likely to be treated downstream
- Planting a seed without insecticide treatment is considered a liability
  - Crop insurance premiums would increase because of the increase in perceived risk to the crop
- Fungicide-only treated seeds are virtually impossible to purchase
- 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 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 day after plant protection
  - Majority of planters used do not have capability to make this type of application since the introduction of treated seed.

**(C) Economic impact from crop loss as compared to crop yield when neonicotinoid treated article seeds are used**

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](#)

- 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
- 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.
- 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.

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

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](#)

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](#)

- 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
  - 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
- 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)
  - 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 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.
- Sources of neonicotinoid exposures are coming 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 practical option for VT growers at this time.

#### **(F) Ways to reduce pest harborage from conservation tillage practices**

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](#)

- Conservation tillage practices 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)

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

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](#)

- 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
- 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 Assembly and Senate passed the Birds and Bees bill (waiting on Governor signature) in June 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.

- 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.