

Evaluations of Seed Treatments for Managing Early Season Pests of Corn: Will Neonic Substitutes be a Good Alternative?

Principal Investigators

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Executive Summary

Most corn and soybean growers in New York plant seed treated with insecticides. But are those treatments really needed in every field? The recent scrutiny on neonicotinoids (aka: neonics) causing harm to pollinators has brought this question to the forefront. Given all the negative attention that neonicotinoids have received in the media in recent years regarding pollinator health, it's no surprise that they are on the chopping block in some NY legislative bills. Neonics have a bad reputation as having negative effects on bee health. And, it's true that they can be lethal to bees and other beneficial pollinators, especially if applied to crops at incorrect timings or under the wrong conditions. However, they are very effective at managing some potentially destructive early-season pests, are safer for humans and most wildlife due to their low mammalian toxicity, and they help farmers raise healthy and productive crops to feed livestock and all of us. It's important that we consider both the positive and negative effects of these seed treatments, and consider alternatives where appropriate. In 2019, a very last-minute pilot study was coordinated to include five on-farm trials to compare a neonic seed treatment with an anthranilic diamide alternative seed treatment, against a non-insecticide control treatment in corn silage. Despite our best efforts with lining up grower cooperators and getting seed and chemistries donated all within a few weeks, the weather wasn't cooperative. Unfortunately, only one of the five trials was planted, and there was no insect pressure at that location to provide a comparison of treatments. In 2020, with more planning time, we received funding to repeat the planned 2019 studies on 4 farms across NYS. Again, pest pressure was low at all sites. We were unable to differentiate among seed treatments for stand counts or yield.

Issue

Neonicotinoid (neonic) insecticides are a normal part of most typical commercial seed treatment packages that come standard on the majority of corn and soybean seed planted in NY and the rest of the country. The neonics are very effective at managing some of our primary early-season insects of concern in NY, including seedcorn maggot, wireworm, and native white grubs, which can significantly reduce crop stands and potentially yields during severe infestations. Agricultural practices on much of the corn and soybean acreage in NYS are favorable for losses to these pests because of our high levels of organic matter incorporation, whether it be in the form of manure, cover crops or rotation with forage sods which are very attractive to these pests. Prior to the widespread adoption of neonic seed treatments, field crop farmers suffered many losses to these pests. Management options included pyrethroid or organophosphate insecticides, which each pose more health and environmental risks than the neonics. Otherwise, farmers were

forced to replant fields, when feasible, to compensate for losses to seedcorn maggot. The ease of use and increased safety of these neonic seed treatments made them a widely popular tool, which almost eliminated losses to these early-season pests for the past 20 years. Farmers have grown to rely on these ‘insurance’ seed treatments, and it can be challenging to obtain corn (silage or grain) or soybean seeds that are not treated with neonics. Unfortunately, the neonic insecticides are very harmful to bees and some other beneficial insects due to their ability to move off-target via dust or in ground water. And, it’s never a good idea to rely so heavily on one group of pesticide for so long over such wide geography, given the increased risk for resistance development in pest populations. Furthermore, some recent research has indicated that there is no economic benefit to these seed treatments in soybean production.

Because of the proposed legislative ban on neonics, it’s important that we investigate alternatives to neonic seed treatments for field crops production. Therefore, despite a complete lack of funding, we coordinated five statewide, on-farm trials in 2019 with CCE field crop specialists to run trials to compare a neonic seed treatment with an anthranilic diamide alternative seed treatment, against a non-insecticide control treatment in corn silage. Extensive plant stand counts would be conducted, and yields would be measured to determine any differences among seed treatments. Seed and seed treatment chemistries were donated, as was time and land for the trials, reflecting how important field crop stakeholders viewed this research to be. In 2020, four trials were funded by the NY Corn and Soybean Growers Association to repeat efforts planned for 2019.

Progress Summary

The weather during the spring of 2019 was exceptionally wet. Farmers struggled to get enough of their acres planted for their own silage and grain needs. Prevented planting claims rolled in on countless acres throughout NY. Unfortunately, this meant that the planned trials could not be a priority for the cooperating farmers. Only one of the five trials was planted, and there was no insect pressure at that location to allow for an effective comparison of treatments in 2019.

However, support for this research among farmers and stakeholders is strong. We were encouraged to pursue this project and to seek funding for expanding the trials and other IPM research for neonic alternatives in 2020. Three grant proposals were submitted to 1) repeat the on-farm seed treatment trials, 2) investigate a growing degree day model for predicting losses to seedcorn maggot, and 3) evaluate staggered planting dates to determine if cultural practices like shifting planting dates can reduce losses to early season pests in lieu of insecticide seed treatments, and 4) conduct a statewide survey to determine pest pressure and losses caused by these early-season pests in NY to determine if the seed treatments are necessary. Only one proposal was funded to repeat the on-farm seed treatment trials in 2020.

In 2020, four replicated on-farm seed treatment trials were planted. Extensive stand counts were measured, as was end of season silage yield. Due to low pest pressure at all four sites, we were unable to determine any significant differences for stand counts or yield at any location or across locations. Seedcorn maggot is highly unpredictable and sporadic. Despite our efforts to select fields with enhanced preference for these pests, we did not get the pest pressure necessary to evaluate treatments. However, this did not mean that seedcorn maggot wasn’t an issue in other

parts of NY in 2020. We had multiple reports of damage and losses to seedcorn maggot, and some requiring hundreds of acres of replant necessary due to losses.

Expected and Observed Impact

As with most proposed legislative bans on pesticides, this is a polarizing topic. Our goal and expected impacts were to 1) determine actual risk to losses from the pests that the neonic seed treatments target, 2) evaluate seed treatment alternatives, and 3) investigate other integrated pest management tactics such as cultural control methods like planting dates and reliance on predictive models.

The trials were completed, but results were inconclusive. Dr. Elson Shields has funding to investigate the potential efficacy of beneficial entomopathogenic nematodes at suppressing seedcorn maggot in 2021. Meanwhile, we encourage growers and CCE specialists to report and document losses to these pests annually to improve economic estimates of losses to these pests to determine any value of the neonic seed treatments.

Project Conclusion

The aforementioned goals and impacts will be challenging because of the suppressive effect the widespread use of neonic seed treatments has had on populations of early-season pests that they control. However, we'd like to be prepared with alternative recommendations if this important pest management tool is banned. Ultimately, it will be best to establish effective integrated pest management programs for these early-season pests, incorporating all available tools. Proper determination of the value of neonic seed treatments in field crops and losses to the pests they protect against will require multiple years of data collection and analysis. Meanwhile, we need to continue to investigate alternative management practices to minimize losses, should these important tools be lost.