Growing GMO free corn: Insect management challenges revisited from the pre-GMO era

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Seed Treatments:

Seed treatments on corn seed is a critical component to achieve a uniform plant stand, particularly in cropping systems with animal manures such as our dairy farms. Without a uniform plant stand, economic yields are always a challenge. In some situations, seedling insects are shown to reduce plant stand by more than 50%. For the 2019 growing season, it appears that our use of neonic seed treatments are not threatened. Neonic seed treatments are effective against the two main seedling insect pest, seed corn maggot and wireworm. Activity against Black Cutworm larvae is variable at best. The standard "250" seed treatment dose is effective against the seedling insects listed above but not corn rootworm. For activity on corn rootworm, the "1250" dose needs to be used. A new class of compounds called Anthranilic diamides are being tested as replacements to the neonic seed treatments. These compounds work well on Seed Corn Maggot, but are weak on wireworms.

Black Cutworm:

Black Cutworm is a long-ranged spring migrant which rides the warm southern spring winds into NY between late-March and mid-April. Upon arrival, moths lay their eggs on grassy weeds in the field before the corn is planted. When these weeds are killed by tillage or herbicide, the larvae continue to feed on the dying tissue until the planted corn emerges and then moves over to the corn. It is important to remember that Black Cutworm larvae are in the field before corn planting and the larvae are usually early-mid-sized when the corn emerges. If the eggs were actually laid in the emerging corn, the developing corn would grow to V6 before the black cutworm larvae developed into the 4 instar where they begin cutting. V6 corn is very resistant to being cut by Black Cutworm.

Insecticide on the seed is often promoted to have Black Cutworm control properties, but control is highly variable and dependent on moisture conditions. Field scouting is the only dependable and reliable method to detect Black Cutworm infestations and treat them before economic loses occur. Smaller larvae feed on leaf margins leaving ragged leaves and do not begin cutting until the fourth larval stage. A trained scout can easily detect these larvae before cutting and recommend a timely application of a foliar insecticide to prevent damage. The threshold for treating a corn stand for Black Cutworm is 5% or more of the plants cut.

Armyworm:

Armyworm is a long-ranged spring migrant which rides the warm southern spring winds into NY between mid-May and early-June. Upon arrival, moths lay their eggs in grass hay fields and other grassy areas. When those areas are stripped from feeding by the larvae, the larvae "march" into neighboring field which are often corn. Scouting is the only reliable way to detect this insect and monitor its movement into adjacent corn. The threshold for treatment in whorl sized plants is 3-larvae per plant with feeding damage present.

Corn Borer:

European corn borer before the GMO era was never an economic pest in NY field corn. While it could be found in almost every field, populations needed to be one larva in every plant before any economic impact could be measured. Reported infestations were never close to that population. With the introduction of corn borer-GMO corn varieties, the corn borer populations have fallen to an extremely low level and are not expected to poise any threat to the corn producer growing non-GMO corn.

Corn Rootworm:

Western corn rootworm remains the primary major insect pest of corn production, costing US corn farmers nearly $1 billion to control it. In NY, first year corn never has any problem with corn rootworm damage because the current NY strain of corn rootworm only lays its eggs in existing corn fields. Corn producers who annually rotate between corn and a non-corn crop do not need to deploy any management strategy for corn rootworm control. Corn producers who grow corn in a field for more than a single year are the producers who need to pay attention to the various corn rootworm management options. Generally speaking, the longer a field is in continuous corn production, the higher the risk from corn rootworm larval feeding injury and economic losses. For example, a 2nd year corn field generally has about a 25% risk for an economic infestation of corn rootworm and a 4th year corn field has 80-100% risk.

Scouting: Adult scouting protocols are well tested and are useful in predicting the probability of a corn rootworm infestation the following spring. Adult rootworms are counted on three consecutive weeks starting around pollen shed. If the average adult beetle count is 1 beetle/plant for the 3 week period, the field is usually at risk the following year from corn rootworm feeding injury. More information can be found at the following link:

https://nysipm.cornell.edu/sites/nysipm.cornell.edu/files/shared/field-corn-scouting-proc.pdf

Management options: The non-GMO corn producer only has two viable options to manage corn rootworm in continuous corn in years 2-6. Best control is the use of a granular insecticide in a T-band in front of the press wheel. An in-furrow application of a granular insecticide has a much lower efficacy than the T-band. Calibration of the granular insecticide applicators is important for good corn rootworm control. However, many producers no longer have granular boxes on their corn planters and the use of granular insecticides at planting is no longer an option. The only other option with some level of efficacy is the high rate of seed treatment on the seed (1250 rate). Often, this treatment fails under high corn rootworm larval pressure or wet growing seasons particularly in the months of May and June.

The use of liquid insecticide in the liquid popup fertilizer at planting has become a popular option and is pushed very hard by the various pesticide industry sales people. Unfortunately, this insecticide application is seldom successful in protecting the corn roots from corn rootworm larval feeding.

Western Bean Cutworm:

Western Bean Cutworm (WBC) has become an emerging challenge for the corn producer in NYS with the heaviest populations along Lake Ontario in WNY and across NNY. Previous larval control with Cry1F incorporated into the plant has increasingly failed to control the larvae. In the production of GMO-free corn, management of WBC becomes an important issue to be aware of. The larvae feed on the developing ear after pollination. The threat to the corn producer is both yield loss and mycotoxin contamination. Ingress and feeding by the WBC larvae opens the developing ear to increased infection by mycotoxin-producing fungi. At this point in time, the threat of high levels of mycotoxin in the harvested grain and chopped silage is the bigger issue than kernel/yield loss.

Scouting: Use of pheromone traps to time scouting efforts is recommended. Moth flight begins about the last week of June, so traps should be in place by mid-June and should be checked weekly. Scouting should begin when multiple moths are being captured with frequency. Monitoring efforts should be focused upon fields that are just beginning to, or soon will, shed pollen. Fields past pollen shed are less attractive to the female moths to lay eggs.

Scout plants by examining the upper surfaces of new and not-yet unfolded leaves of plants in multiple areas of the field. 20 consecutive plants in at least 5 locations are suggested as a minimum. Infestations are very patchy, and oviposition occurs over several weeks so multiple field visits will be required. Upper leaf axils, tassels (before pollen shed), and silks should be examined as well for young larvae. Monitoring and early detection are critical for application of foliar insecticides. There is a suite of insecticides that will kill young larvae, but ensuring they receive a lethal dose before entering the ear is difficult.

Economic threshold: When 5% of the plants have egg masses or small larvae and 90-95% of the tassels have emerged, treatment is recommended. If tassels have already emerged and egg hatch is underway, applications should occur when 70-90% of eggs have hatched.

Larvae must encounter insecticide or residue before entering the ear – once they enter the ear insecticide applications are not as likely to contact larvae, making control difficult.