Tips for Pest Management of Corn Rootworms and Spider Mites in North Dakota

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Northern corn rootworm (NCR) and western corn rootworm (WCR) are major insect pests of corn in the Midwest. Corn rootworm larvae damage plants by feeding on roots, which results in plant lodging and reduced yields. Effective control of corn rootworms involves:

- Crop Rotation with non-corn hosts
- Bt corn - Plant your refuge of non-Bt corn
- Bt corn - Avoid using the same Cry protein for >3 years in a row (use a different Bt corn hybrid that expresses a different Cry protein or multiple Cry proteins from the one that may be performing poorly)
- Control any Volunteer Corn (Volunteer corn is a host where rootworms develop (maybe resistant CRW))

Western corn rootworm (male)
(P. Beauzay, NDSU Ext. Entomology)

Bt-Corn Efficacy Trials

In 2013, we evaluated rootworm Bt-corn hybrids with different Bt traits: a Cry3Bb1 hybrid, a Cry34/35Ab1 hybrid, and a 'pyramid' hybrid that contains both Cry proteins. Comparisons were made to a non-Bt-corn hybrid with and without Poncho 1250 insecticide seed treatment. Additionally, the use of Force 3G soil insecticide applied in-furrow was evaluated across all hybrids. Root feeding injury and yield were measured and evaluated. Under **heavy rootworm feeding pressure**, we found that:

- Rootworm Bt-corn hybrids had less root injury than the non-Bt corn hybrids.
- There were no differences for root injury among the rootworm Bt-corn hybrids.
- Rootworm Bt-corn hybrids had higher yields than the non-Bt corn hybrids.
- The use of Poncho 1250 seed treatment on the non-Bt corn hybrids reduced feeding injury, but did not significantly increase yield.
- The use of Force 3G resulted in a yield increase for the non-Bt corn hybrid, but not for the rootworm Bt-corn hybrids.

Western corn rootworm adults feeding on exposed corn ear due to stunted husk leaves from drought stress
(J. Knodel, NDSU Ext. Entomology)

In 2014, we observed severely reduced corn rootworm pressure at all field sites due to the cold open winter, which likely caused high mortality of overwintering eggs. Under **light rootworm feeding pressure** we found that:

- Rootworm Bt-corn hybrids had less root injury than the non-Bt corn hybrids.
- There were no differences for root injury among the rootworm Bt-corn hybrids.
- There were no differences for root injury in the non-Bt corn hybrids regardless of whether Poncho 1250 was used.
- Force 3G soil insecticide did not significantly impact root injury.

Root pruning from corn rootworm larval feeding
(J. Knodel, NDSU Ext. Entomology)

SPIDER MITES IN FIELD CORN

Spider mites on corn leaf (P. Beauzay)

Scouting: Sample at least 20 sites while walking a W-pattern and inspecting about 2 plants per site. Avoid sampling the edges of field.

It is not surprising to see spider mites showing up with the hot dry weather, which stresses crops and favors spider mite outbreaks. Mites are small and magnification is required to see them. A quick sampling procedure to determine whether mites are present is to hold a piece of white paper below leaves, then beat them to dislodge the mites. The mites appear as tiny dust specks; however, they will move after being knocked off the leaf. Another method is to pull plants and examine the undersides of the leaves for mites and webbing with hand lens. Mite infestations begin from the bottom of plants and move upwards into the canopy. Feeding damage by mites first appears as small yellow spots (stippling). As feeding activity increases, leaves become yellow, bronzed or brown, and eventually shed from the plant. Mite infestations typically are first noted near field edges.

Spider mites on corn leaf, note stippling (J. Knodel)

Spider Mite Action Threshold – For spider mites, corn is susceptible to spider mite damage from tasseling through the hard dough stage. When corn has reached the hard dough stage, it is no longer susceptible. **Treatment is advised when Treat when lower ¼ to ⅓ of canopy is injured and mites or mite damage symptoms are present. Do not let mite injury reach the ear leaves.** ***(Source: University of Minnesota, Ostlie & Potter)***

Pest Management: If spider mites are a problem, the **only pyrethroid A.I. that will work is bifenthrin** (Tundra, Sniper, Brigade, Fanfare, Bifenture, etc.) in dry beans, soybeans and field corn. Other pyrethroids, such as lambda-cyhalothrin (Warrior, Silencer, etc.), will cause spider mites to flare up and increase their reproductive rate. Two active ingredients of organophosphate (OP) insecticides for control of spider mites include chlorpyrifos and dimethoate. Residual of insecticides vary with a short to longer length – dimethoate < chlorpyrifos < bifenthrin. We think it's realistic to expect about a 7 to 10 day residual from bifenthrin, a 3 to 5 day residual from chlorpyrifos, and a <3 day residual from dimethoate. If it is hot (>90F), residual will be decreased for any insecticide, so insecticide applications should be conducted during the early morning or late evening when it is cooler. Using the higher rates of labeled insecticides will increase residual. Adequate water volume is very important to control mites. It is extremely important to re-scout for recurring spider mite populations after spraying, since insecticides do not control the egg stage of mites. Eggs will hatch in about 5 days into young mites (nymphs). **Check your fields five to seven days after treatment and again at regular intervals to make sure your insecticide is still controlling the mites.** Spider mites have the reproductive potential to develop insecticide resistance quickly; so if a second treatment may be necessary, rotate the insecticide modes of action and select a different insecticide mode of action. For example, if you use bifenthrin (pyrethroid) for the first application, use a non-pyrethroid product, such as dimethoate or chlorpyrifos (OP), for the second application. Observe preharvest intervals (PHI) for any late season applications.

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