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What's in This Issue

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Technology Development & Agronomy by MONSANTO

Current News and Updates

Wow! We are already starting into the month of July. It seems like just yesterday we were planting some of the first corn and soybean plots. As I look across the geographies of MN/WI it becomes very difficult to provide a generalized crop report as some of the areas to date are still dealing with preventive planting while others were able to plant corn in late April. One thing is for sure — this time of the season it's all about integrated pest management. In this newsletter we start to highlight some of the key issues regarding weeds, insects, and disease in your corn and soybean crop.

Because the season started out kind of slow, and it seemed to take forever to gain heat units, the bugs and weeds have taken their time. Now as we get into the start of summer and growing degree days start to add up, the insects, weeds, and diseases are becoming more prevalent. The big ones we want to hit on as far as insects go are soybean aphids and corn rootworms. Weed issues, and most importantly volunteer corn, are also a component to this issue. This ties in nicely with our CRW article as those volunteer corn plants can be more than just a weed in that soybean field. Finally, we wrap up with some discussion on disease and the thought of incorporating a fungicide into your crop plan. For each one of these short write-ups we could include additional information and discussion, so please as you read this and have questions, give your local technical agronomist a call.

Scouting for Soybean Aphids

Soybean aphids can injure plants, transmit viruses, and reduce soybean yield potential. Insecticides are an effective method of controlling aphid populations; however, insecticides should not be used prophylactically because they can reduce populations of beneficial insects. Scouting can help you make a decision on insecticide use based on soybean aphid population.

Figure 1. Soybean aphids.

Soybean aphids are green with pear-shaped bodies and dark cornicles or "tail pipes" at the end of the abdomen (Figure 1). Aphids, winged or wingless, injure plants by removing nutrients. Additionally, the honeydew excreted by aphids provides a medium for mold to grow on leaves, which can reduce the photosynthetic potential of plants and can result in stunting. Soybean aphids have an enormous capacity to reproduce quickly. Aphid populations can double in size every two to five days under favorable conditions.

Speed scouting (also known as binomial sequential sampling) is a sampling method developed at the University of Minnesota.[1] The goal of this method is to save time over traditional sampling methods and to help make decisions on whether to treat or not, based on the distribution of the aphid population in a field. Scouting should begin when plants are at R1 and can stop when plants reach R5. The economic threshold is generally 250 soybean aphids per plant with increasing populations on 80% of the plants.[2] As with other scouting methods, sample random areas within a field, not just along a field edge. To implement speed scouting, follow these steps:

1. Select a plant at random. If there are less than 40 aphids on the plant, count the plant as 0 (zero). If there are 40 or more aphids, count the plant as 1.
2. Walk 20 to 30 paces and randomly select another plant; repeat step 1 until a minimum of 11 plants have been sampled.
3. Add up the total score:
    - If the score is 6 or less, stop sampling and repeat the process in 7 to 10 days.

(cont. on p 4)

Scouting for Corn Rootworm Damage

Corn rootworm (CRW) larval hatch is likely occurring across the area. Scout and evaluate CRW larvae levels to determine best management tactics.

Life Cycle. Most CRW eggs are laid in late-summer and remain dormant until the following spring. They begin hatching in late May or early June depending on the accumulation of growing degree days (GDDs). Research indicates that about 50 percent of larvae hatch when soils have accumulated approximately 700 GDDs (soil base 52° F).[1] The appearance of lightning bugs (fireflies) is an indicator for some people that corn rootworm larvae have hatched.[2] Rootworm larvae are creamy white with a brown head (Figure 2). They complete three growth stages or instars as they feed on corn roots for 3 to 4 weeks in June and July.[5] After the third larval instar, pupation occurs in mid to late July. Adult beetles emerge from the soil a short time later to feed on foliage, pollen, and silks. Adults are often active throughout August.

Damage. CRW larvae generally feed on corn from V4 to R2 growth stages, which can increase the risk of root lodging and potentially decrease yield potential because of reduced root mass to effectively absorb nutrients or water. Root lodging may be particularly noticeable after a soaking rain accompanied by high wind. Root lodged plants may become "goose-necked" as they try to straighten to an upright position, which can affect harvestability. Root and stalk rot pathogens can enter and infect the plant through the wounds to the root system.

Figure 2. CRW larvae.


Figure 3. Root pruning due to CRW feeding.

Scouting. Begin scouting in fields that had high adult rootworm beetle populations the previous July and August. Because CRW larval damage often cannot be seen above ground, dig a series of corn root balls (one foot in diameter), shake off the soil, and wash roots. Root damage due to CRW larval feeding consists of brown feeding scars, tunneling inside larger roots, and root pruning with the roots eaten back toward the base of the stalk (Figure 3). Injury may be limited to a single root, or consist of multiple whorls of roots chewed back. The Iowa State Node-Injury Scale can be used to evaluate feeding damage (Table 1). The economic threshold is 0.25 to 1.0 on the Iowa scale depending on moisture conditions. Impact on yield will be less when plants have ample moisture and may establish new roots. An interactive Node-Injury Scale is available through Iowa State at http://www.ent.iastate.edu to demonstrate how the scale is applied to different injury levels.

Management for Current Season. Foliar-applied insecticides are generally not effective at controlling larvae feeding on roots. If beetle counts equal 3/4 to 1 beetle per plant, foliar spray(s) can be used to control beetles, which can reduce egg laying and subsequent CRW the following year. If foliar applications are going to be applied to control beetles in a refuge for a *B.t.* trait protected seed product, both the *B.t.* product and the respective refuge must be treated. The foliar insecticide cannot be a *B.t.* crop protection product. More information can be found in the Agronomic Alert titled "Corn Rootworm Rescue Treatment Decision Aid", which is available at www.agAnytime.com.

Table 1. Iowa State University Node-Injury Scale.[3,4]

Scale	Description
0.00	No root feeding
0.10	10% of a node eaten within 1.5 inches of stalk (usually one root)
0.50	50% of a node eaten within 1.5 inches of stalk
1.00	One complete node removed, eaten back within 1.5 inches of stalk
2.00	Two complete nodes removed
3.00	Three complete nodes removed (highest rating that can be given)

Damage between eaten complete nodes is recorded as the percentage of the node missing, i.e. 1.50 = 1 1/2 nodes eaten, 0.25 = 1/4 of one node eaten, etc. As an example, 1.50 = one (1) full node eaten and 50% (.50) of another node eaten.

Sources: [1]Hodgson, E. 2011. Predicted corn rootworm egg hatch approaching. Iowa State University. www.extension.iastate.edu (verified 6/20/13); [2]Gray, M. 1998. Corn rootworm egg hatch update. No. 11, The Bulletin. University of Illinois; [3]Oleson, J. D. et al. 2005. Node-injury scale to evaluate root injury by corn rootworms. Journal of Economic Entomology. Vol. 98: 1-8; [4]VanDyk, J. 2005. Interactive node-injury scale. Iowa State Entomology. Iowa State University. http://www.ent.iastate.edu. (verified 6/20/13); [5]Krupke, C., et al. 2009. Corn rootworms. Field Crops IPM. Purdue University. http://extension.entm.purdue.edu (verified 6/20/13).

Weed Management Reminders

Crop development and yield are affected by weed density, weed species, and the length of time weeds are in competition with the crop. Tips for mid-season weed control include:

- Scout fields to identify and determine the size of weeds present in fields.
- Scout fields after herbicide application to determine effectiveness and identify escapes.
- Control weeds early when they are smaller and generally easier to control; larger weeds or weeds growing under stress conditions are harder to control.
- Use herbicides with different modes of action.
- Use the recommended application rate according to the herbicide label.

In-season Control of Volunteer Corn in Soybean

Volunteer corn can be an aggressive competitor for water, nutrients, and sunlight. Significant volunteer corn stands can reduce soybean yield potential.

Volunteer corn can substantially reduce soybean yield potential. Research conducted in Minnesota showed that soybean yield was reduced 1% for every 75 clumps of volunteer corn per acre.[1] Volunteer corn in soybean can lead to an increase in corn rootworm populations in next year's corn crop by allowing rootworms to complete their life cycle.

Most grass herbicides (ACCase inhibitors) are effective at controlling volunteer corn when applied post emergence. Many of them can be tank mixed with Roundup WeatherMAX® or Roundup PowerMAX® herbicides. Refer to individual product labels for specific tank mixing instructions. Grass herbicides widely used for controlling volunteer corn include Assure® II, Fusion®, Fusilade® DX, Select®, Select Max®, Poast®, and Poast Plus® herbicides.

Figure 4. Clumps of volunteer corn in soybean.

Select Max herbicide can be tank-mixed with Roundup WeatherMAX or Roundup PowerMAX herbicides to control volunteer corn in Genuity® Roundup Ready 2 Yield® and Roundup Ready® soybeans and does not need additional surfactant when so tank-mixed. Select Max use rate depends on the height of volunteer corn:

- Corn is 12 inches or less—6.0 oz/acre
- Corn is 24 inches or less—9.0 oz/acre
- Corn is 36 inches or less—12.0 oz/acre

Sources: [1] Gunsolus, J. 2009. Volunteer corn management in corn and soybean. Univ. of MN Ext. http://blog.lib.umn.edu (verified 6/24/13).

Fungicide Applications in Corn and Soybean

Disease management in high yield corn and soybeans can pay dividends. A timely foliar fungicide application when disease is present can help protect yield potential and improve plant health.

Scouting fields regularly can help farmers determine if a fungicide application is necessary. Prioritize scouting by first looking at fields with a high risk of disease development and would most likely have a positive response to foliar fungicides. Favorable environments include:

- Corn-on-corn fields with high residue,
- Fields near river bottoms and creeks,
- Fields planted with susceptible corn or soybean products,
- Fields with a history of disease,
- Areas forecasted for high moisture conditions or those exposed to continuous rain or fog.

Accurate identification of foliar diseases can help determine whether or not a fungicide application would be beneficial. Foliar diseases caused by fungi, including northern corn leaf blight (NCLB), southern corn leaf blight (SCLB), gray leaf spot (GLS), southern rust, and common corn rust, can be controlled with a foliar fungicide, such as Headline AMP® (Figures 5 & 6). Other foliar diseases like Goss's wilt and blight are caused by bacteria and are not controlled by fungicides. Disease identification is important because symptoms of Goss's are similar to symptoms of NCLB. Identification is equally important in soybean.

Figure 5. Typical NCLB cigar-shaped lesion (top) and rectangular GLS lesion (bottom).

For example, fungicides can be effective against Asian soybean rust, but this disease can be confused with early symptoms of bacterial pustule (Figure 7). Submit plant samples to a diagnostic clinic to help identify the disease symptoms present.

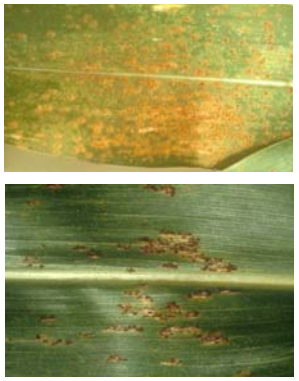

Figure 6. Pustules of southern rust (top) and common rust (bottom).

Scouting to determine the level of disease presence is an important factor in deciding whether a fungicide application would be profitable. Research has shown that fungicide use in corn is most profitable when there is a high risk of foliar disease development. Based on data from across the Corn Belt, an average yield increase of 6 bu/A is needed for a fungicide application to hit the break-even mark.[1] Achieving this yield increase is less likely in low disease pressure environments. In soybean, data from Iowa State indicates that 60-70% of strobilurin fungicide applications made at R3 at least break even.[2] Confirming that disease levels warrant the use of fungicide will help increase the likelihood of a positive return.

Figure 7. Symptoms of bacterial pustule (top) and Asian soybean rust (bottom).

Sources: [1] Wise, K. and Mueller, D. 2011. Are fungicides no longer just for fungi? An analysis of foliar fungicide use in corn. APSnet Feature. http://www.apsnet.org (verified 6/25/13); [2] Bestor, N. et al. 2011. The effect of spraying fungicides at R1 or R3 on soybean. Iowa State University Extension. http://www.extesnion.iastate.edu (verified6/25/13).

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Scouting for Soybean Aphids (cont. from p 1)

- If the score is 7 to 10, sample an additional 5 plants as in step 1.
- If the score is 11, treat the field within 7 days.
- If you are unable to make a decision after sampling 31 plants (a score of 23 to 26) repeat the process in 3 to 4 days (see example below).

Plants sampled	No control needed	Continue sampling	Treatment needed
11	6 or less	7 to 10	11 or more
16	10 or less	11 to 14	15 or more
21	14 or less	15 to 18	19 or more
26	18 or less	19 to 22	23 or more
31	22 or less	23 to 26	27 or more

If there is any doubt about the results of this decision-making process, confirm your treatment decisions by rechecking your numbers and verifying that aphid population levels are actually increasing. There are worksheets and smart phone apps available to help keep track of plant numbers and speed scouting scores. Several of these can be found through the University of Minnesota Northwest Research and Outreach Center online at http://www.nwroc.umn.edu.

Sources:
[1] Glogoza, P. 2012. Help! I don't like to count aphids: soybean aphid speed scouting. University of Minnesota. http://www.nwroc.umn.edu (verified 6/25/13); [2] Smith, D. 2011. Aphid management recommendations for 2011. University of Wisconsin Cooperative Extension. http://fyi.uwex.edu (verified 6/25/13); Pedersen, P. 2007. Soybean aphid. Iowa State University Extension. http://extension.agron.iastate.edu (verified 6/25/13).