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Minnesota and Wisconsin

What's in This Issue

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Technology Development & Agronomy by MONSANTO

Current News and Updates

In order to achieve optimum yields, it is important to keep the plant happy all season long. This will be more of a challenge for some than others, with many areas of Minnesota and Wisconsin experiencing wetter than normal conditions this spring. It may be more important this year to be scouting your crops, monitoring growth and development, looking for signs of nutrient deficiencies, making timely post-emergence herbicide applications, and monitoring insect activity. A good scouting plan should include two to three trips across the field early on in the crop development stage to make sure a sufficient stand has been established and the crop is off to a healthy start. In addition to optimum plant stands, yield starts being established early on with the number of soybean nodes being decided around the V5 stage and kernel rows fixed by the V7 stage in corn. In order to help maximize yield potential in these stages, planned sidedress and herbicide applications need to be done in a timely manner. Err on the early side with these applications because stress from nutrient deficiencies and weed infestations can rob yields in a big way. Pay special attention to color of your corn this year. The heavy rains may have caused nitrogen loss in the soil. If corn has not regained its color and is still yellow by the V5 stage, a supplemental application of nitrogen maybe needed.

Identifying Nutrient Deficiencies in Corn

Nutrient deficiency symptoms are not always due to insufficient nutrient supplies in the soil. Symptoms can be induced by other factors such as poor root development, root damage, unfavorable soil conditions, or unfavorable weather. Proper testing can help identify the problem and possible corrective action.

Symptoms. Plants that are deficient in nitrogen (N) or sulfur (S) tend to be yellow and stunted. In both cases, symptoms are favored by cold, wet, or low organic matter soils. Nitrogen-deficient plants can also appear spindly with lower leaves developing a yellow-orange color in the shape of an inverted "V" beginning at the tip (Figure 1). Symptoms occur in older leaves first and then progress up the plant because N is mobile and is translocated from old to young leaves. Plants deficient in S may have yellowing between veins, particularly in younger leaves. Older plants rarely show symptoms of S deficiency. Young plants deficient in phosphorus (P) have bluish-green leaves that are slightly narrowed with a reddish-purple coloring at the tips and along the edges (Figure 2). If conditions improve for P uptake, new leaves may be symptom-free. Symptoms are seldom seen on plants past knee-high. Conditions favoring P deficiency include soils that are cold, too wet, too dry, or compacted. Symptoms of potassium (K) deficiency are rarely seen before plants are knee-high. Edges of lower leaves turn yellow and then necrotic. Potassium is mobile within the plant, so symptoms of K deficiency progress up the plant in the same way as symptoms of N deficiency.

Figure 1. Foliar symptoms typical of N deficiency.

Tissue Testing. Plant tissue testing indicates the plant nutrient status at the time of sampling and can be a good complement to a soil testing program. The plant nutrient content at any one point in time reflects not only the nutrient content of the soil, but also the ability of the plant to uptake nutrients to that point in the *(cont p 3)*

Figure 2. Foliar symptoms typical of P deficiency (left) and K deficiency (right).

Post-Emergence Herbicides in Corn and Soybean

Preserving crop yield potential is one focus of post-emergence (POST) herbicide applications. Keeping weeds at bay until canopy closure in corn (10 fully developed leaves) and soybean (R3) is critical to avoid yield loss.

Tank Mixes and Carriers. A wet spring can lead to last minute changes in post-emergent weed control programs. Always read the product label for specific information on adjuvant recommendations and appropriate tank mix partners. Herbicides may be compatible in a tank mix if the herbicide has a single active ingredient formulated for a labeled tank mix scenario. However, the same tank mix compatibility cannot be assumed for the active ingredient in a pre-packaged herbicide mix.

UAN (28%) is often used to enhance weed control or overcome mineral antagonism in tanks. Additionally, many are considering a sidedress application of UAN between corn rows. Because 28% UAN alone can cause foliar burns on emerged corn, it should not be used as a POST herbicide carrier in corn. Other weed control options should be used if the planned preemergence herbicide application with the 28% UAN solution carrier was delayed.

Weed and crop height need to be considered in timing POST herbicide applications. Smaller weeds are generally easier to control while larger weeds or weeds growing under stress conditions are harder to control. Later weed flushes can occur with applications made too early. Weather can also delay applications.

Harness® Applications in Corn. Weeds that are present in emerged corn can be controlled with Harness® Xtra and Harness® Xtra 5.6L + crop oil concentrate (COC) to help control grasses that at a 2 to 3 inch height. Keep in mind, COC may cause crop injury depending on temperature, humidity, and other stresses. If additional atrazine is added, the total amount of atrazine used should not exceed the labeled limit of 2.0 pounds of active ingredient per acre. Table 1 outlines application timing for Monsanto POST herbicides.

Table 1. Monsanto Roundup Ready PLUS® Weed Management Solutions in Corn.

Herbicide	Maximum Crop Height or Growth Stage
Bullet®	5”
Degree Xtra® Harness® Xtra Harness® Xtra 5.6L TripleFLEX® Herbicide	11”
Roundup PowerMAX® or Roundup WeatherMAX® (for corn products with Roundup Ready® 2 Technology) + IMPACT® Herbicide	V8 or until corn reaches 30” freestanding, whichever is first; Use drop nozzles from 24” to 48”
Warrant® Herbicide	30”

Warrant® Herbicide in Soybean. Emerged weeds are often controlled with Roundup® brand agricultural herbicides in soybean fields. POST weed control with residual activity should be included to control weeds, such as waterhemp, that have high rates of emergence in June.[1] Warrant® Herbicide has a 30 day window of residual control, and encapsulation technology to improve crop safety in POST applications. Warrant® Herbicide can be applied to soybean through the R2 growth stage and can be tank mixed with Roundup® brand agricultural herbicides.

Keep Herbicides on Target Fields. Drift management should be a priority. Vapor drift (associated with herbicide formulation and climate conditions) and particle drift (related to application method and equipment) can be managed to maintain potential herbicide efficiency (Table 2.) Vapor drift is a case of herbicide reaching the target, but then moving offsite. Particle drift is a case of some herbicide not reaching the target before moving offsite. The potential lack of weed control from the reduced rate of herbicide on the target field can be costly if reapplication is needed and yield potential was lost. Always read and follow pesticide label directions.

Sources: [1] Buhler, D.D. et al. 2008. Sustainable agriculture—relative emergence sequence for weeds of corn and soybeans. Iowa State University. SA-11; Knezevsic, S.Z. et al. 2003. Yield penalty due to delayed weed control in corn and soybean. Plant Management Network; Owen, M. et al. 2007. UAN and preemergence herbicide applications on emerged corn. Iowa State University. IC-498(7).

Table 2. Factors affecting drift and management options.

Factor	Management Options
Droplet size	Pressure should be on the lower end of the range recommended for that nozzle to create a coarse droplet.
Equipment	If spray volume needs to be increased, nozzle size (rather than pressure) should be increased.
Boom height	Boom height should be lowered, but should maintain a spray pattern with full-coverage.
Wind speed and direction	Unless indicated on labels, spraying should be done when winds are less than 10 mph and wind direction is away from sensitive areas. No wind may indicate an inversion is present. Volatile herbicides and fine droplets (100 microns or less) should not be sprayed.
Climatic conditions	Fine spray droplets may vaporize and herbicide becomes suspended in air under conditions of low humidity, warm temperatures, and calm winds. An inversion could move suspended herbicide offsite. Wait until conditions improve before spraying herbicides with enough activity to injure sensitive crops.

Source: Jordan, T. et al. 2009. Reducing spray drift from Glyphosate and growth regulator herbicide drift caution. Purdue University.

Identifying Nutrient Deficiencies in Corn (cont. from p 1)

growing season. One characteristic that is often measured is the concentration N in plant tissues.[1] Other nutrient levels can also be measured.[2] The data from tissue analysis is only as good as the sampling method. Specific instructions on proper plant tissue sampling are usually available with the sampling kit from the plant analysis laboratory.

Soil Testing. An important part of evaluating fertility programs is soil testing. Results of tissue testing and soil testing may confirm each other, or they may indicate that nutrient deficiency symptoms are due to other factors besides deficient nutrient levels in the soil. If soil test results show that nutrient levels are optimum, then nutrient deficiency symptoms in plants may be due to other causes such as pest injury, pesticide use, tillage, or soil compaction.

Results and Recordkeeping. Data from one year of plant tissue analysis or soil sampling is probably not sufficient information on which to base a fertility program. Subsequent years of testing will help build a more accurate picture and give guidance as to where fertility programs may need to be adjusted. Recording details such as symptom patterns in a field and the timing of when the problem appears can also provide valuable information over the long-term.

Sources: [1] Blackmer, A.M. 1997. Basics of corn tissue testing. Integrated Crop Management. Iowa State University. Online: http://www.ipm.iastate.edu (verified 6/3/13); [2] Flynn, R. et al. 2004. Sampling for Plant Tissue Analysis. New Mexico State University. Online: http://aces.nmsu.edu (verified 6/3/13); Plant tissue analysis. Agronomy Guide. Penn State Extension. Online: http://extension.psu.edu (verified 6/3/13); Sawyer, J. 2004. Nutrient deficiencies and application injuries in field crops. Iowa State Univ. Ext. IPM 42. Online: http://extesnion.agron.iastate.edu (Verified 6/3/13).

In-Season Nitrogen Applications

Where fertilizer nitrogen (N) did not get applied due to weather conditions or soil and tissue testing indicate less than optimum N levels, sidedressing N can be an effective way to apply N where and when it is needed.

Sidedress N applications should occur before the V8 stage of growth, when plant demand for N rapidly increases (Figure 3). Research shows that when sidedress applications are done by around V6, yield loss due to inadequate N is unlikely.[1] The optimum application window for sidedress N is longer when a portion of the total N was applied pre-plant or at planting. Maintaining N at optimum levels in the soil throughout the growing season will also facilitate uptake of phosphorus, potassium, and sulfur.[2]

To determine the best method for in-season N application, consider the source of N to be used, crop growth stage, and the ability to minimize N loss. With these factors in mind, injecting anhydrous ammonia or UAN solution between rows is often the best option. With applications between rows, N is kept at a safe distance to avoid crop injury and it is placed where the crop roots will be growing. Appling N in every other row can help increase the speed of application and research indicates that yield will not be negatively impacted because every row will have N applied on one side.[3] If anhydrous is used, make sure that the knife slit closes properly to reduce ammonia loss and consider using a nitrification inhibitor on heavy textured, poorly drained soils.

Surface application of solid ammonium-containing fertilizers, which are not subject to volatilization, or broadcast application of urea with a stabilizer may be the next best options. Applications should be timed so that fertilizers will be incorporated by rain within 10 days to minimize N loss. Broadcast urea applications can be done until the corn is knee-high, but earlier is better to reduce the risk of canopy injury. Apply when foliage is dry to reduce the adhesion of

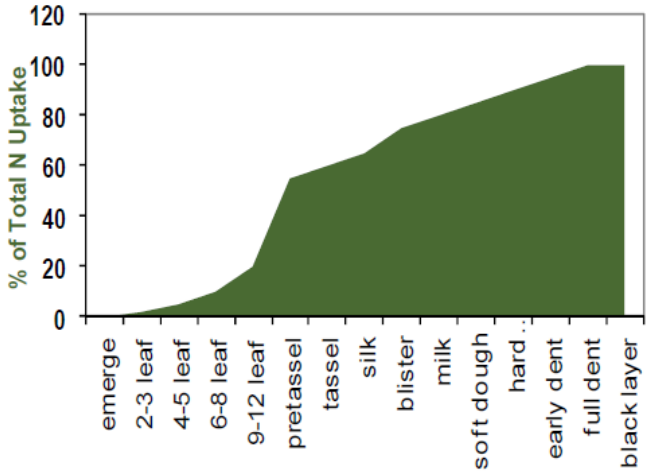

Figure 3. Percent of total nitrogen uptake for corn by growth stage. Nitrogen data adapted from "How a corn plant develops," Special Report 48. from Iowa State University.

dry products to leaves. Dribble application of UAN between rows can also be a good option, but the application process can be slow and a portion of the N is subject to volatilization. As with dry fertilizers, rain is required for incorporation.

Broadcast application of UAN is the least desirable option. In addition to the volatilization and timing concerns with a dribble application, broadcast UAN can cause severe leaf burn. That being said, if insufficient N is available for crop growth, the yield benefit from a broadcast application of additional N will likely outweigh the foliar burn it causes. To reduce the likelihood of foliar damage when applications occur after V8, use drop hoses so that UAN is applied directly to the soil surface and contact with the crop canopy is minimized.

Sources: [1] Sideressing nitrogen for the corn crop. 2011. University of Illinois. Online: http://news.aces.illinois.edu (verified (6/3/13); [2] Ciampitti, I.A. et al. 2013. Maize nutrient accumulation and partitioning in response to plant density and nitrogen rate: I macronutrients. Agron. J. 105: 783-795; Fernandez, F. 2010. Applying nitrogen after planting. University of Illinois Extension. Online: http://web.extesnion.illinois.edu (verified 6/3/13).

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Insect Notes

Corn rootworm (CRW) hatch generally occurs in late May or early June in most of the Midwest. Approximately 50% of larvae hatch when soils have accumulated 683 to 767 growing degree days.[1] With the cool and wet weather so far this season, hatch may be delayed further into June. Larvae feed on corn roots for 3 to 4 weeks in June and July, with peak root damage usually occurring in mid-July. Plan to dig plants and observe roots for damage and/or larvae presence during this time period to evaluate pest pressure. Predictions of CRW activity based on weather and soil conditions in your area are available online at http://www.insectforecast.com.

In alfalfa, the first cutting and subsequent exposure to sunlight and lack of food may have been enough to control alfalfa weevils. However, cool and wet weather can lead to greater larval survival rates.[3] Scout cut fields by looking for delayed greenup. To determine if alfalfa weevils are the cause, check the crown, under leaf litter, and in the juncture between the crown stems and soil. Another insect to start thinking about in alfalfa is the potato leafhopper. These insects usually reach Wisconsin by mid-May in most years. Generally by late June or early July, leafhopper generations are overlapping and populations increase rapidly. Under normal summer temperatures, potato leafhopper populations with overlapping generations can double in size in less than 10 days.[3]

Sources: [1] Hodgson, E. 2011. Predicted corn rootworm egg hatch approaching. Iowa State University. Online: http://www.extension.iastate.edu (verified 6/3/13); [2] Jensen, B. 2012. Alfalfa weevil scouting after first cut (1). University of Wisconsin Cooperative Extension. Online: http://www.youtube.com (verified 5/3/13); [3] Hogg, D.D. et al. 2000. Potato leafhopper damage to alfalfa. University of Wisconsin. Online: http://www.uwex.edu (verified 6/3/13).