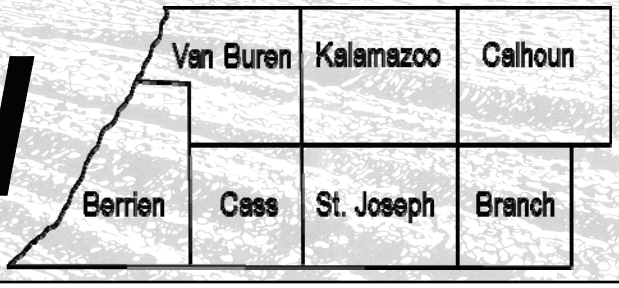
IN THE ROW



Volume 1 Issue 4 July, 2013 A Newsletter Serving Corn & Soybean Producers in Southwest Michigan

Dear Agricultural Producer:

In The Row is a new newsletter serving corn and soybean producers in Southwest Michigan. This is a cooperative effort involving the Michigan Soybean Checkoff, the Corn Marketing Program of Michigan and MSU Extension. All printing, postage and handling costs associated with the newsletter are covered by the Michigan Soybean Checkoff and the Corn Marketing Program of Michigan. MSU Extension is responsible for providing timely and relevant crop and pest management information for each issue. Please call Mike Staton at (269) 673-0370 if you prefer to receive the newsletter via e-mail.

Sincerely,

Mike Staton Bruce MacKellar Lyndon Kelley Dale Mutch

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Soybean Aphid Management Recommendations

Mike Staton

Overwintering conditions were excellent for many aphid species including the soybean aphid. Because of this, overwintering and winged soybean aphids are present in Michigan and much of the Great Lakes region. Because Southwest Michigan has not experienced high soybean aphid populations for several years, I am providing a summary of the current management recommendations.

- Scout soybean fields beginning in early July.
- Pay special attention to late-planted fields and fields that are deficient in potassium
- Check the new leaves on smaller plants and check the entire plants (stems and all leaves) on larger plants.
- Select 20 to 30 random plants and determine the number of aphids per plant.
- If there are less than 250 aphids per plant, treatment is *not* warranted but continue to monitor the field.
- Please see the following article "*Should You Adjust Your Soybean Aphid Threshold For High Crop Values?"*
- An insecticide application is economical when there are at least 250 aphids per plant on 80% of the plants in the field and the population is increasing.
- Do not tank mix herbicides and insecticides due to timing and application incompatibility.
- Please see the article *"Equipping and Operating Sprayers to Control Insects and Diseases in Soybeans" on page 3.*
- A list of registered insecticides is available online at: http://msuent.com/

Should You Adjust Your Soybean Aphid Threshold for High Crop Values?

Dr. Kelley J. Tillmon, Soybean Entomologist, South Dakota State University

Many producers may wonder what higher crop values mean for the insect treatment thresholds they've used in the past. It's logical to assume that climbing commodity prices mean lower treatment thresholds, but that's not always the case. For soybean aphid thresholds in particular, 250 aphids/plant is still a valid guideline for decision-making. This has to do with the relationship between the decision (aka 'economic') threshold, the economic injury level, and the damage boundary.

The economic injury level is the point where the insect injury justifies the control cost. This does vary with commodity value and control costs. The decision threshold is a lower value – not when economic loss is occurring, but when to make a decision take action to keep a pest population from climbing to the economic injury level. It builds in time to react before the population becomes a problem, and is based on how quickly the population can be expected to grow. The damage boundary is the lowest insect pressure/damage level where yield loss can be detected. It is not realistic to have an economic injury level lower than the damage boundary, because no economic injury can occur when yield is not being lost. The damage boundary for soybean aphid is greater than 4000-5000 cumulative aphid days [a population greater than 485-600 aphids/plant].

When soybean values were lower the economic injury level ~675 aphids/plant, and the recommended decision threshold was 250 aphids/plant to give a 7-day lead time. Recalculating the economic injury level for more current values in Michigan, at $11.25/bushel and $13/acre for treatment, the economic injury level can be calculated on paper as 382 aphids/plant. However, this is below the damage boundary (where yield loss begins), and thus is not a valid economic injury level. Using a conservative damage boundary of 485 aphids/plant, a decision threshold of 250 aphids/plant can still be used and gives a lead time of 5 days to arrange treatment before the populations reaches 485 aphids/plant. So if treatment can be made in this window, this decision threshold will still prevent economic loss. The data behind these guidelines were collected over three years in 19 locations under a wide variety of conditions, including moisture stress (source: Ragsdale et al. 2007, Journal of Economic Entomology 100: 1258-1267). In most trials in the region, we have not seen a yield return when using a threshold lower than 250 aphids/plant.

Producers should also keep in mind that there are drawbacks to prophylactic or "insurance" treatment, even when treatment cost is low. Treated fields often see pest resurgence or secondary pest outbreaks that wouldn't have occurred otherwise, because the beneficial predatory insects that were helping keep pests in check are gone. Furthermore, many products (particularly most pyrethroids), can flare spider mite populations, which is especially a concern in hot, dry weather.

Equipping and Operating Sprayers to Control Insects and Diseases in Soybeans

Mike Staton

Applying insecticides and fungicides to large soybean plants is much different than applying systemic postemergence herbicides to weeds that are two to four inches tall. In fact, entomologists and pathologists don't recommend tank mixing herbicides with insecticides or fungicides due to the timing and application incompatibilities. Producers need to understand the differences and make the equipment and operating adjustments necessary to maximize insect and disease control. Leaf coverage is more important with insecticide and fungicide applications. Another key difference is that insecticide and fungicide droplets need to penetrate large and dense soybean canopies.

Spray volume has the greatest impact on canopy penetration and leaf coverage. Increasing spray volume increases penetration and coverage. Spray volumes of at least 15 gallons per acre are required when applying insecticide and fungicides to soybean through growth stage R3 (pod development). After R3, 20 gallons per acre are necessary.

Droplet size is the second most important factor affecting canopy penetration and leaf coverage. Research has shown that fine to medium droplets having volume median diameters (VMDs) ranging from 200 to 350 microns will provide the optimum canopy penetration and leaf coverage. All nozzle manufacturers use a common spray quality classification system which divides droplets into six droplet size categories. Please see table 1. **The colors listed in table 1 should not be confused with the color of the nozzle itself. The color of the nozzle describes the flow rate of the nozzle and the colors in the table describe the nozzle's droplet size range.**

Table 1. ASAE standard S-572 (spray quality categories)

Droplet Category	Color	VMD (microns)
Very Fine	Red	< 150
Fine	Orange	150 - 250
Medium	Yellow	250 - 350
Coarse	Blue	350 - 450
Very Coarse	Green	450 - 550
Extremely Coarse	White	> 550

Source: Spray-droplet size measurement and classification, Scott Bretthauer

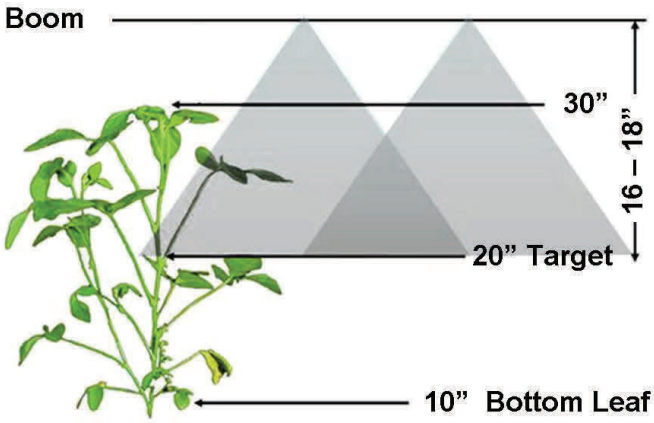
As ground speed increases, spray volume per acre and vertical droplet velocity decrease reducing canopy penetration. Ground speeds of less than 10 mph are recommended.

Nozzle pressures between 40 and 50 psi are recommended as long as droplets remain in the fine to medium category and not too many fine droplets are produced.

Select nozzles that produce a flat fan spray pattern as these perform better than cone nozzles. Research conducted at Ohio State University showed that nozzles producing a *single* flat fan pattern provided better canopy penetration than nozzles or combinations of nozzles producing a twin fan pattern when used in large and dense soybean canopies. However, twin fan patterns improved coverage on smaller plants. Venturi or air-induction nozzles should not be used for insecticides and fungicides as they require very high pressures to produce medium droplets. **Consider spray volume, droplet size, ground speed and operating pressure when selecting spray nozzles. When using droplet size classification charts, select nozzles that produce droplets near the fine end of the medium (yellow) category and deliver 15 to 20 gallons per acre at your ground speed and operating pressure.**

Operating the spray boom at the correct height is essential as it controls spray pattern uniformity and droplet velocity. Dr. Ozkan, agricultural engineer at the Ohio State University, recommends setting the target area midway between the lowest leaves on the plant and the top of the canopy. Please see the example in figure 1.

Figure 1. Recommended boom height for 110 degree flat fan nozzles spaced 20" apart when applying insecticides and fungicides in 30" tall soybeans



Last Chance Nitrogen Application with Irrigation

Lyndon Kelley

After the heavy rainfall that S.W. Michigan saw in late June, many fields need one more option for nitrogen application. Your fields may have lost part of your nitrogen to water through de-nitrification, had nitrates move below the root zone following heavy rainfall or simply had the crop just grew so fast that you missed the side dress window. Either way, some fields may need additional nitrogen to reach yield goals. You can contact your local Extension office for information on estimating nitrogen loss from your fields, but if your field is irrigated, you continue to have options.

Irrigated production has the advantage of fertigation as an option in nitrogen management. Fertigation is the process of applying fertilizer through irrigation water. Liquid 28% nitrogen is the most common product for fertigation, but urea and micro-nutrient solutions are also available to meet crop nutrient needs, with proper equipment.

Fertigation is often the last step in a three split nitrogen management plan, following starter and side dress applications. Starter allows quick access to nutrients to the newly germinated plants. Side dress applications usually account for the greatest portion of N budget, feeding the plant just prior to the rapid growth phase. Depending upon the equipment used, side-dressing can also aerate soil and improve water infiltration. Fertigation makes up the remainder of the budget supplying nitrogen to the crop just prior to tassel emergence. For efficient use, Nitrogen applications need to be made prior to tasseling to ensure that the nitrogen applied is in an available form for the plant to uptake and use during early grain formation.

From a management standpoint, fertigation allows producers the opportunity to evaluate crop stands, N losses due to wet conditions or heavy rains and the current market situation to make adjustment to the nitrogen plan to meet the crops needs and maximize profitability.

As an example, let's say that a producer has a 200 bu. Yield goal on an irrigated field that calls for 230 lbs. of nitrogen. At planting he applies 30 lbs. of nitrogen, followed by 120 lbs. applied at cultivation in early June. This leaves a nitrogen need of 80 lbs. The producer decides to apply the remaining 80 lbs. split into two 40 lbs. applications through the irrigation. We get about 3.1 lbs. of actual nitrogen for each gallon of 28% N applied. He calculates that he needs to apply just short of 13 gallons per acre. Knowing that his system irrigates 2 acres per hour, he calculates that he needs to inject 26 gallons of the fertilizer per hour.

Knowing the actual amount of fertilizer the equipment will inject is essential. It is also important to know that the system applies water uniformly across the field. Center pivot systems of good design and repair will have uniformity co-efficient of greater than 85%. Many systems have uniformity co-efficient in the 70 to 75% range allowing the misapplication of a quarter of the water and fertilizer going through them. Information on evaluating irrigation system uniformity (along with training opportunities) is available through the irrigation section of the St. Joseph County Michigan State University Extension web page. http://www.msue.msu.edu/portal/default.cfm?pageset_id=28706

The inherent risk of injecting fertilizer into a water system dictates the need for backflow protection. Both Indiana and Michigan have resource protection rules that require the use of Chemigation valves for the protection of both surface and ground water sources. Chemigation valves create an air gap in the pipe line downstream from the pump when the pump is shut down. The air gap breaks the suction created by water retreat back to groundwater or surface water. Chemigation valves for most irrigation application are available from local irrigation dealers for less than $700. Installation cost is much less at the time of pump installation and should be included in almost all new irrigation pumping installations.

In some situations producers may choose to dribble or broadcast nitrogen on the field by air or Hi- tractor and use the irrigation to incorporate the Nitrogen if dry weather follows. This technique is quick, requiring no irrigation equipment modification, but is dependent on the availability of aerial applicators or in row high clearance application equipment.

Detailed information on injection pumps, backflow protection, safety interlocks, and procedures for calibrating an injection system is available in bulletin E-2099 available from the Michigan State University Extension bulletin system or electronically at the irrigation section of the St. Joseph County MSU Extension web page. http://www.msue.msu.edu/portal/default.cfm?pageset_id=28706

Bacterial Blight and Septoria Brown Spot in Soybean

Martin Chilvers, Field Crop Pathologist, Michigan State University

With all the rain that we've been having a number of foliar diseases are popping up on soybeans. Two of the most common early season diseases that we typically see in soybean are Bacterial blight and Septoria brown spot. Bacterial blight caused by *Pseudomonas syringae* is a bacterial pathogen that is seedborne and can overwinter on soybean debris in the field. The *Pseudomonas syringae* bacterium is capable of surviving on the surface of the soybean leaf and infecting when conditions are right, either through natural openings such as stomata or through damage caused by hail, wind and cultivation. The relatively cool temperatures we have been experiencing together with rain, wind, and in some instances hail have been ideal for this disease. Young soybean leaves are most susceptible to this pathogen and lesions can often be found on the mid to upper canopy. Bacterial blight can be identified by the typical small brown angular lesions with a yellow halo, and as disease progresses lesions can grow together with diseased centers eventually falling out, which gives the leaves a tattered appearance.

Management of Bacterial blight is limited to core IPM practices as fungicides are not effective against this bacterial pathogen. No cultivars are completely resistant to Bacterial blight; however some cultivars demonstrate greater resistance or susceptibility than others. Crop rotation to non-hosts such as corn, wheat and other non-legume species will help reduce inoculum. Tillage where possible can also help reduce survival of *Pseudomonas syringae* infested debris through burial and rapid breakdown of soybean debris.

Septoria brown spot is another disease that is very common throughout Michigan. The disease is caused by the fungus *Septoria glycines*, which resides in overwintered soybean leaf and stem debris. During rainfall events, spores of *Septoria glycines* are splashed from the debris up into the lower canopy of soybean plant where they are able to infect and cause Septoria brown spot symptoms. Septoria brown spot symptoms consist of small brown irregular spots that can turn the leaf yellow and cause premature leaf drop. The disease is often present but primarily on the lower canopy and if weather conditions are warm and dry it rarely moves into the upper canopy. Septoria brown spot although common in the lower soybean canopy is generally thought to have a minimal yield impact. However, under situations of high disease pressure yield losses of 1 to 9% may occur. Heavy and frequent rainfall later in the season (i.e. August) has in some instances allowed *Septoria glycines* spores to be splashed up into the upper canopy allowing Septoria brown spot disease to develop on upper leaves.

Management of Septoria brown spot includes use of crop rotation to corn, wheat, other small grains and alfalfa. Tillage where possible can assist in breaking down soybean residue and thereby reducing subsequent overwintering of disease inoculum. Fungicides can be used to assist in control of Septoria brown spot, however studies in Michigan and Ohio have demonstrated that significant yield effects may only occur half of the time. This season we have foliar fungicide trials in multiple locations across the state to examine control of Septoria brown spot and any potential yield benefits.

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New Cover Crop Survey Shows Improved Corn And Soybean Yields Following Cover Crops During The Drought Of 2012

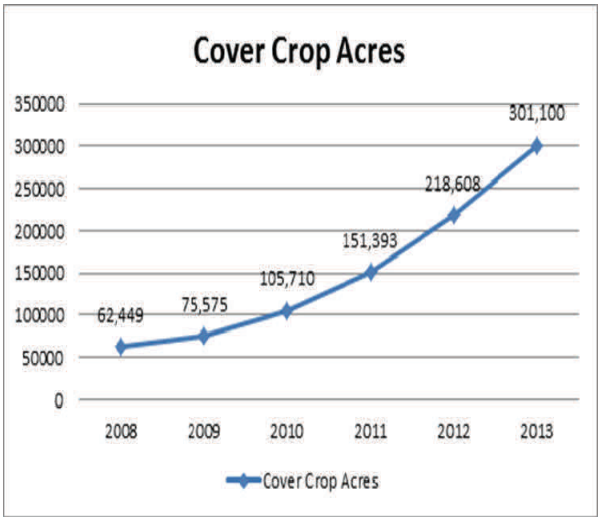
Dr. Dale Mutch

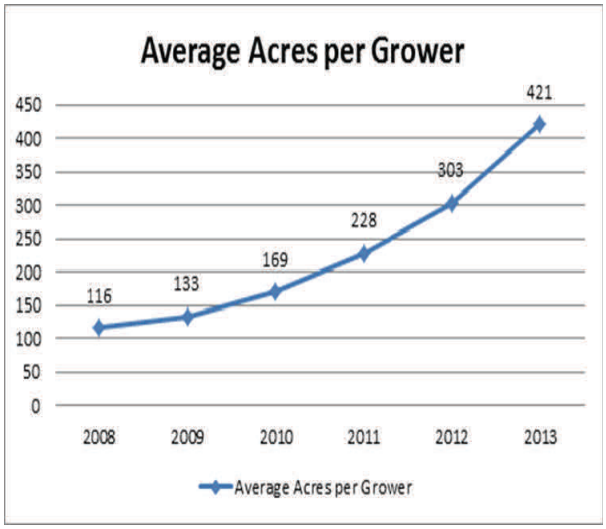
A report has just been released with detailed results from a farmer survey on cover crops. The survey was carried out in partnership between the USDA North Central Region Sustainable Agriculture Research and Education (SARE) program and the Conservation Technology Information Center (CTIC). More than 750 farmers were surveyed during the winter of 2012-13, primarily from the Upper Mississippi River watershed. Questions on cover crop adoption, benefits, challenges, and yield impacts were included in the survey. Key findings included the following:

- During the fall of 2012, corn planted after cover crops had a 9.6% increase in yield compared to side-by-side fields with no cover crops. Likewise, soybean yields were improved 11.6% following cover crops.
- In the hardest hit drought areas of the Corn Belt, yield differences were even larger, with an 11.0% yield increase for corn and a 14.3% increase for soybeans.
- Surveyed farmers are rapidly increasing acreage of cover crops used, with an average of 303 acres of cover crops per farm planted in 2012 and farmers intending to plant an average of 421 acres of cover crops in 2013. Total acreage of cover crops among farmers surveyed increased 350% from 2008 to 2012.
- Farmers identified improved soil health as a key overall benefit from cover crops. Reduction in soil compaction, improved nutrient management, and reduced soil erosion were other key benefits cited for cover crops. As one of the surveyed farmers commented, "Cover crops are just part of a systems approach that builds a healthy soil, higher yields, and cleaner water."
- Farmers are willing to pay an average (median) amount of $25 per acre for cover crop seed and an additional $15 per acre for establishment costs (either for their own cost of planting or to hire a contractor to do the seeding of the cover crop).

"It is especially noteworthy how significant the yield benefits for cover crops were in an extremely dry year," Dr. Rob Myers, a University of Missouri agronomist and regional director of extension programs for North Central Region SARE, stated. "The yield improvements provided from cover crops in 2012 were likely a combination of factors, such as better rooting of the cash crop along with the residue blanket provided by the cover crop reducing soil moisture loss. Also, where cover crops have been used for several years, we know that organic matter typically increases, which improves rainfall infiltration and soil water holding capacity."

Full results of the survey are available online at: http://www.northcentralsare.org/CoverCropsSurvey
For additional information on cover crops go to the SARE Cover Crop Topic room at: http://www.sare.org/Learning-Center/Topic-Rooms/Cover-Crop-Topic-Room





These graphs represent cover crop acres planted by the farmers who reported their acreage on the survey.

Cover crop photos are available from NCR-SARE for media usage from Marie Flanagan, NCR-SARE regional communications specialist, at mart1817@umn.edu.

When to Irrigate Soybeans for the Greatest Dollar Returns

Lyndon Kelley and Mike Staton

Soybeans are often seen as a rotation to crop with higher water needs. But how do you manage irrigation for soybean for greatest returns?

In general, the most important time to irrigate soybeans is from R3 (beginning pod, one pod 3/16 inch long on one of the upper four nodes on the main stem having unrolled leaves) through R6 (full seed, one pod containing green seed that fills the pod cavity on one of the upper four nodes on the main stem having unrolled leaves). Water applied at R3 to R5 encourages flower and pod retention. This increases yield potential by increasing the number of seeds per acre. Irrigation water applied after R5 (one pod with1/8 inch long seeds on one of the upper four nodes on the main stem with unrolled leaves) is also beneficial as it improves yields by increasing seed size. In fact, if soybeans can be watered only one time during the growing season, it should be at R5.

Abundant early season rainfall created lush growth and potential large plants, with smaller rooting system than normal and prone to white mold. These lush large soybean plants will need irrigation water as necessary through seed fill (R6). Failure to continue irrigation may cause lower finial yields. This is because soybean plants are able to adjust to soil moisture conditions by changing pod number and seed size. Plants may produce fewer and smaller seeds if irrigation is discontinued. The earlier rainfall may have also reduced rooting depth. Monitor moisture levels in the top two feet of soil closely and maintain the moisture level above 50% of the available water holding capacity throughout R6.

Cloudy, wet weather combined with lush soybean growth can lead to white mold diseases issues. Once flowering begins, manage irrigation applications to wet the crop as few times as possible. Few large applications timed to not overfill the soil profile while maintaining at least 50% available moisture is ideal.

Maintaining soil moisture for soybeans right to season's end yellowing is important. Research from the University of Missouri showed that terminating irrigation too soon can cause yield losses of ¾ of a bushel per acre per day on a sandy soil. The Missouri researchers made the last application around September 20th which was well into the R7 growth stage. However, most universities recommend timing the final irrigation run so that the soil moisture level is near 60% of the available water holding capacity at the beginning of the R7 growth stage.

Precise timing of all irrigation runs, including the final run, requires a working knowledge of basic irrigation scheduling concepts such as the amount of water required for soybeans at various growth stages to reach maturity, available soil water capacity, allowable water depletions, soybean growth stages, effective rooting depth and estimating soil moisture status. Lyndon Kelley and Steve Miller have compiled a list of Irrigation Scheduling Tools that explain and utilize these concepts.

Season Insect and Leaf Disease Control In Corn

Bruce MacKellar

With the early growing season in the books across southwest Michigan, it is now time to start concentrating on late season insect pests and corn leaf diseases. Currently (July 12), the earliest planted corn is just beginning to show silks. The latest planted corn is between V6-V8. **Western corn rootworm** larvae have been feeding on corn roots for the last 2-3 weeks. You should monitor for symptoms of rootworm feeding (goose-necked corn), leaf tissue (window pane) feeding and silk clipping. Scout non-rotated fields where Bt corn is being grown. If you find damage or high levels of corn rootworm adults, consider rotating this field and potentially surrounding corn fields to some other crop next season. Be sure to control volunteer corn.

Western bean cutworm moths have been slower to emerge this year than last; moth flight should be ramping up soon. Moths prefer to lay eggs in fields that are pre-tassel emergence. Fields that already have tasseled are less attractive. Look for egg masses on the upper side of the top 3-4 leaves of the plant. ***Threshold for treatment: 5% of the plants have egg masses***. Extended moth flight-fields should be scouted multiple times; egg mass counts should be cumulative. Young larvae feed on tassels and remain vulnerable to insecticide applications before they enter the ear. There are lots of insecticide options available to control western bean cutworm.

Diseases:

Leaf disease development is a function of three factors: Sensitive hybrid or inbred, the "right" weather conditions and the presence of the disease organism. The three leaf diseases we are primarily concerned with in S.W. Michigan are common rust, northern corn leaf blight and gray leaf spot. Continuous corn fields are more likely to be at risk for gray leaf spot and northern corn leaf blight. The disease overwinters in corn residues. Common rust in not much of a

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problem in hybrids because of varietal resistance to the disease, but is commonly treated for in seed corn production. Rust does not overwinter in Michigan; spores move northward on air currents from the gulf coastal regions each year. Conditions over the last 2 weeks of June were very conducive for the development of fungal pathogens: persistent rainfall, cloudiness, high relative humidity levels and moderate to warm temperatures. Impact on yields for all three of these diseases is higher if the leaf damage occurs by tasseling. Later season tissue damage is expected to have lower impact on yields. This is why the best application timing for fungicides in infected fields is between tassel emergence through silking. **Scouting:** The leaves of the lower canopy should be scouted for signs of disease. If diseases are present, the goal would be to apply fungicides to protect the leaves around the ear leaf through the upper canopy at Vt. At V-14, focus your attention on the 3 leaves below the ear leaf.

Common Rust: Initial pustules begin as tan flecks on the leaves. The areas become reddish brown in color with irregular appearance. Most commercial corn hybrids are tolerant enough to common rust that treatment is not necessary. Treatment of inbred lines is much more common. Consult your seed company agronomist for guidelines on when to begin scouting and treatment for common rust.

Northern Corn Leaf Blight: Look for long and narrow tan colored lesions on the leaves that run parallel to the veins. There is no treatment threshold for NCLB. Consider applying a fungicide if the lower leaves have NCLB lesions, the hybrid is susceptible and conditions are expected to remain cool, cloudy and moist during the next few weeks.

Gray Leaf Spot: Gray leaf spot lesions initially look like pinpoint areas of leaves that are forming yellowish halo's. These symptoms progress to form grayish to brownish lesions bounded by leaf veins that often give infected leaves a "checked" appearance. Gray leaf spot infections often occur following prolonged periods of warm (75-85F) wet cloudy weather with relative humidity levels near 90%. Areas of fields with low airflow often are prone to show the symptoms first. Purdue's pathologist Dr. Kiersten Wise suggests commercial corn producers consider treatment with a strobilurin or strobilurin-triazole fungicide if 50% of the plants show symptoms below the ear leaf, the hybrid is susceptible or moderately susceptible and the wet, warm and humid conditions are expected to continue.

Current Weather Outlook: A return to sunny, drier and less humid conditions is expected. This should reduce the environmental risk factors for corn leaf disease development in the short run.