Wisconsin Crop Manager

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Soybean Flowers, Glyphosate Label, and Wheel Track Damage…Oh My!

Hanna, S., Conley, S. P., Shaner, G., and Santini, J. 2008. Fungicide application timing and row spacing effect on soybean canopy penetration and grain yield. Agronomy Journal: 100:1488-1492.

Given the quick start to our soybean growing season we will begin to see many soybean fields begin to flower (R1) next week (6/21/15). As we enter the soybean reproductive growth phase there are a few things to keep in mind. The first is that soybean will produce flowers for ~3 to five weeks, depending upon planting date and environment. During that time soybean will abort anywhere from 20 to 80% of the flowers that they produce. Generally it is the first and last flush of flowers produced that are most likely to be aborted.

R1 Soybean growth stage

Next, the timing window for glyphosate applications in our early planted soybean is quickly closing. Glyphosate labels indicate that applications can be made through R2 or full flower. The R3 growth stage begins when one of the four top nodes with a fully developed leaf has a 3/16 inch long pod. Applications made after the R3 stage begins are off-label applications. On average it takes ~ 4 days to move from R1 (beginning flower) to R2 (full flower) and ~10 days from R2 to the start of R3 (beginning pod).

Last but not least, wheel track damage made from ground applications may start to reduce yield. Sprayer wheel traffic from first flower (R1) through harvest can damage soybean plants and reduce yield (Hanna et al. 2008). Our research suggests that an adequate soybean

Spraying soybean at the R1 crop growth stage stand (more than 100,000 plants per acre) planted in late April though mid-May can compensate for wheel tracks made when a field is sprayed at R1. Yield loss can occur, however, when wheel tracks are made at R1 or later in thin soybean stands (less than 100,000 plants per acre) or late planted soybeans. Regardless of stand, plants could not compensate for wheel tracks made at R3 (early pod development) or R5 (early seed development). The average yield loss per acre is based on sprayer boom width (distance between wheel track passes). In our trials yield losses averaged 2.5, 1.9, and 1.3% when sprayer boom widths measured 60, 90, and 120 foot, respectively. Multiple trips along the same wheel tracks did not increase yield loss over the first trip.

Wheel track damage to drilled soybean at R1

New findings on soybeans, climate, and yields

Shawn P. Conley, Soybean and Wheat Extension Specialist

Global annual temperatures have increased by 0.4°C since 1980 with several regions exhibiting even greater increases. Climate change appears to have affected crop yields in some countries, and these effects are expected to continue. Crop management strategies could help to mitigate the potential negative impacts of climate change on crop yields. Strategies include the development of new cultivars and hybrids, altered maturity groups, changes in planting dates, the use of cover crops, and greater management of previous crop residues. However, it is important to understand in-season weather variability before any specific adaptation strategies are proposed.

To read more, click the link below.

http://www.coolbean.info/library/documents/Soybean_Nature_2015_FINAL.pdf

Vegetable Crop Update June 23, 2015

Amanda J. Gevens, Assistant Professor & Extension Vegetable Plant Pathologist

The 16th issue of the Vegetable Crop Update is now available which adresssess the following topics:

- disease forecast updates (early planted/emerged fields in Gr. Marsh now surpassing threshold of 300 P-Days/DSVs surpassing 18 threshold for all but late planted Antigo)
- late blight updates (no new reports)
- cucurbit downy mildew (first reports in MI and Ontario Canada today)
- Phytophthora crown and fruit rot
- Aim herbicide 24c special use registration for WI hops
- hop downy mildew update

Click here to view this issue.

Cereal Leaf Beetle

Bryan Jensen, UW Extension

Chris Allen just contacted me about some suspected cereal leaf beetle damage in wheat. I've talked to a few more people and they also mentioned similar damage. Damage, although mostly on the flag leaf, doesn't appear to be of economic concern.

Cereal leaf beetles are not an insect that we have a lot of experience with. At least not in recent history. Perhaps there was some economic damage when they were first introduced to the Midwest in the early 1960's, but I suspect several predators and/or parasitoids have kept their numbers low. Matter of fact, I'm not sure I can ever recall someone having to control them in the past. However, knowing what causes the damage may be useful itself.

The adult cereal leaf beetle is approximately ¼ inch long and slender. They have a brightly colored orange head and thorax and dark bluish (almost metallic) wing covers. The larvae are yellowish to brown in color and can be slimy because they will cover their body with fecal material. This can give them a slug-like appearance. However, you will see a distinct head, no antennae and 3 sets of legs on cereal leaf beetle larvae.

Cereal leaf beetles overwinter as adults and are limited to one generation/year. Their host range includes most small grains as well as other grasses. Damage is very clear-cut and diagnostic. Both adults and larvae will feed on the same plant and leave long narrow feeding scars often with the cuticle intact. This "window paneing" may coalesce if damage is sever.

Published economic thresholds vary. To give you a perspective, Penn State suggests 1 larvae/4 tillers, North Dakota State suggest three larvae/plant and Michigan State suggests 1 larvae/flag leaf. Having different economic is not that unusual as researchers use the natural population available. All states, however, stress the importance of protecting the flag leaf from significant damage.


Cereal Leaf Beetle larvae


Cereal Leaf Beetle damage

Photo Credit: Kansas Department of Agriculture Archive, Bugwood.org

Herbicide resistance management for common lambsquarters and horseweed

Liz Bosak, Outreach Specialist, Department of Agronomy, University of Wisconsin

In the June 13th issue of the Wisconsin Crop Manager, I discussed herbicide resistance management for giant and common ragweed, http://wcws.cals.wisc.edu/herbicide-resistance-management-for-giant-and-common-ragweed/ . This week's featured herbicide resistance threats are common lambsquarters, *Chenopodium album*, and horseweed, *Conyza canadensis*. Weed scientists across the Midwest and Midsouth have identified eleven species of weeds that are of most concern for herbicide resistance because of their ability to compete with crops and to develop resistance to different herbicide sites of action. In 1979, University of Wisconsin weed scientists identified a population of common lambsquarters resistant to atrazine, a photosystem II inhibitor (www.weedscience.org). Lambsquarters populations in Michigan and Ohio have been found resistant to ALS inhibitors. In 2013, University of Wisconsin researchers identified horseweed plants resistant to glyphosate, http://wcws.cals.wisc.edu/late-season-weed-escape-survey-in-wisconsin-identifies-a-second-county-with-a-glyphosate-resistant-horseweed-population/ . Ohio and Delaware have horseweed populations resistant to both ALS inhibitors and glyphosate. Resistance to a single site of action has occurred in over twenty states.

Now is the time to start thinking about fall horseweed management. Emergence typically occurs in the early spring and again in the fall. Long-term no-till systems tend to harbor significant horseweed populations. Scouting in mid to late summer to locate any escapes from spring herbicide applications is important for herbicide resistance management and to decide whether to switch to a horseweed management program that includes both spring and fall control measures. Fall herbicide applications can help to reduce horseweed populations in problem fields. Also, if dandelion is an issue, then there are two reasons to consider fall herbicide applications. University of Wisconsin researchers found that fall dandelion control is best prior to next year's corn crop. Their results are available as a slide presentation at http://www.slideshare.net/weedscience/ag-lime . Kevin Bradley at the University of Missouri has a video, less than five minutes, discussing the importance of application timing for horseweed control, https://youtu.be/mbs9cJKMCsk . Ohio State and Purdue University have a great fact sheet on horseweed management at https://ag.purdue.edu/btny/weedscience/Documents/marestail%20fact%202014%20latest.pdf . Also, the TakeAction website has a fact sheet with spring and fall herbicide recommendations at http://takeactiononweeds.com/wp-content/uploads/2014/06/management-of-herbicide-resistant-horseweed-marestail-in-no-till-soybeans.pdf

Common lambsquarters can be difficult to manage because of an early and sustained emergence period, long seed persistence, and competitive ability. A 50 percent reduction of seed in the soil seedbank requires about 12 years and 78 years for a 99 percent reduction. Management goals should include: starting with a clean field, using a pre-emergence residual herbicide, scouting, and applying a post-emergence herbicide if necessary. For specific management recommendations, please consult the TakeAction fact sheet at http://takeactiononweeds.com/wp-content/uploads/2014/06/common-lambsquarters-management-in-soybeans.pdf

Common lambsquarters located in a non-treated plot at the Rock County Farm in Janesville, WI on June 24, 2015. The corn was planted on May 13.

Weed photo of the week

Time to Consider Your White Mold In-Season Management Plan

Damon Smith, Extension Field Crops Pathologist, Department of Plant Pathology, University of Wisconsin-Madison

Many early planted soybeans in Wisconsin are nearing the R1 (beginning flower) growth stage. This means that soybean growers should consider their in-season white mold management plan and if they are going to implement it. Research has shown that this is the best time to apply fungicides for control of this lethal soybean disease, if conditions are conducive for infection. Before we consider the in-season control options, lets review some basic information from our white mold (Sclerotinia stem rot or SSR) fact sheet. You can also download a PDF version of the fact sheet by CLICKING HERE.

Figure 1. Damage from white mold in a soybean field under irrigation.

What is Sclerotinia stem rot? Sclerotinia stem rot (SSR), also known as white mold, is a serious and often lethal fungal disease that affects a wide range of agricultural crops in the U.S. including many broadleaf vegetable crops (e.g., carrots, cruciferous plants, peas, potatoes, snap beans) and field crops, especially soybean. SSR is most severe on soybeans in high-yielding environments that have dense, fast-growing canopies (Fig. 1).

What does Sclerotinia stem rot look like? SSR causes sudden wilting of soybean leaves and rapid plant death. Lower stems of affected plants become bleached and under moist conditions (e.g., high humidity, frequent rain), become covered with a cottony white fungal growth. Small, black structures that look like rat or mouse droppings (called sclerotia) form on and inside the stems and pods of affected plants (Fig. 2).

Figure 2. Sclerotia of the white mold fungus inside a soybean stem.

Where does Sclerotinia stem rot come from? Sclerotinia stem rot is caused by the fungus Sclerotinia sclerotiorum which survives as sclerotia in dead plant tissue. Sclerotia can survive for five years or more in soil. A cool, moist environment favors Sclerotinia stem rot development. Under these conditions, sclerotia germinate to produce small, mushroom-like structures (called apothecia) that produce spores. These spores can be spread by wind, insects, or rain splash. In soybeans, most infections occur via open or senescing (i.e., withering) flowers. Occasionally, the fungus will spread from plant-to-plant via direct contact of roots or other plant parts.

How can I save plants with Sclerotinia stem rot? SSR is difficult to control once the disease has occurred. If affected plants are limited to a small area in a field, removal and destruction of plants may help to limit production of sclerotia that can further contaminate and cause long-term problems in the field; however, this strategy usually is not feasible on a large scale. If affected plants are removed, they should be burned. DO NOT compost plants or till them into the soil.

How can I avoid problems with Sclerotinia stem rot in the future? To prevent introduction of the SSR fungus into soybean fields, be sure to plant sclerotia-free soybean seed. Also, harvest fields with SSR last to avoid spreading sclerotia of the SSR fungus from field to field on combines. In fields with a history of SSR, grow soybean cultivars that have been bred for SSR resistance. This is the most economical and successful long-term strategy for SSR control. In addition, consider using no-till production for three to four years as this will reduce the number of viable sclerotia near the soil surface. Rotate soybeans with small grain crops that are not susceptible to SSR (e.g., wheat, barley, oats) to further reduce the number of viable sclerotia in the soil. Increase row spacing and reduce soybean seeding rates to promote a more open canopy that will have better air circulation and thus dry more rapidly. Also, make sure fields are well drained and avoid excessive irrigation especially during flowering. Remember that the SSR fungus prefers wetter conditions; under drier conditions the fungus is less likely to infect. Maintain good broadleaf weed control. Weeds not only decrease air circulation and promote wetter conditions, but can also be hosts for the SSR fungus. Finally, there are fungicides and biological control products available for SSR management. Several biocontrol agents (the most effective being one that contains a fungus called Coniothyrium minitans) have been shown to be effective in controlling SSR.

What are my In-Season Control Options? Fungicides containing an active ingredient that is a succinate dehydrogenase inhibitor (SDHI), such as boscalid, are often effective in SSR control. The active ingredient picoxystrobin (a type of strobilurin fungicide) has also been shown to be effective in SSR control in university research trials. Applications rates are very important for these products. Research in Wisconsin and surrounding states has indicated that Endura (active ingredient is boscalid) should be applied at the 8 oz/acre rate while Aproach (active ingredient is picoxystrobin) should be applied at the 9 fl oz/acre rate. Timing of fungicide applications is critical. Fungicides should be applied during early flowering (R1) to early pod development (R3) growth stages. Research has shown that Endura is best used when applied in a single application at R1. Aproach should be applied twice with the first application at R1, while the second application should be applied at the R3 growth stage with both applications at the rate indicated above. Fungicide applications made at the full pod (R4) growth stage or later will NOT be effective. In addition, applying fungicide treatments after symptoms are visible will not be effective.

In 2014, we conducted a trial using both Endura and Aproach fungicides applied at the R5 growth stage. Details of the trial can be found by CLICKING HERE and scrolling down to page 12. Prior to fungicide application we rated the plots for disease using the SSR disease severity index or DSI. We then rated the plots again 2 weeks later at the R6 growth stage to see if the disease progression slowed. We also harvested plots to determine yield. Initial DSI levels were fairly high, but uniform among all plots (Table 1). DSI ratings at R6 revealed that neither fungicide slowed the disease or reduced the levels of disease compared to the non-treated controls. Yield for all treatments was around 40 bu/acre for all treatments, and was not statistically significant. These results indicate that even the best fungicide products won't work well on white mold if they are applied at the wrong time. These products have increased yield substantially in research trials where white mold pressure was high, when they were applied at the correct growth stage. In 2013, both programs were among the best in a trial located at the Arlington Agricultural Research Station. Results of that trial can be viewed by clicking here at scrolling down to pages 6 and 7. Timing and preventative application are very important if you choose to use fungicides to control white mold.

Finally, be sure to read and follow all label instructions of the fungicide/biological control product(s) that you select to ensure that you use the materials in the safest and most effective manner possible.

If you would like to learn more about white mold, you can click here to download a PDF copy of a newly revised fact sheet developed by extension soybean pathologists in the North Central region. You can also get more information about white mold by clicking here to watch a short video.

Treatment and Rate/Acre (Crop Growth Stage at Application)	Sclerotinia Stem Rot DSI (R5)[z]	Sclerotinia Stem Rot DSI (R6)[z]	Yield (bu/a)
Non-treated check	42.3	55.3	40.3
Aproach 2.08SC 9.0 fl oz (R5)	56.7	70.6	40.1
Endura 70WDG 8.0 fl oz (R5)	52.8	63.6	38.7
LSD (α=0.05)	--	ns	ns

[z]Sclerotinia stem rot DSI was generated by rating 30 arbitrarily selected plants in each plot and scoring plants with on a 0-3 scale: 0 = no infection; 1 = infection on branches; 2 = infection on mainstem with little effect on pod fill; 3 = infection on

Table 1. Sclerotinia stem rot severity and yield after applications of Endura and Aproach fungicides at R5.

Wisconsin Pest Bulletin 6-25-15

Krista Hamilton, Entomologist

Issue No. 10 of the Wisconsin Pest Bulletin is now available at:
https://datcpservices.wisconsin.gov/pb/pdf/06-25-15.pdf

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DEGREE DAYS: Growing degree day accumulations through June 24, 2015

Late Blight Supplement

Amanda Gevens, Potato & Vegetable Pathologist

I am receiving many questions on late blight symptoms associated with seed sources vs. aerial spore deposition (from external sources). I've included a nice review on this topic from Dennis Johnson, link below. In short, it is tough to identify, with certainty, the source of late blight inoculum in an epidemic. We know potential sources are multiple and include volunteers, cull piles, compost piles, seed, and infected transplants (tomato). We don't have any evidence at this time that the pathogen is persisting in the soil outside of plant tissues.

Can we associate symptoms with inoculum source? Late blight is very dependent upon the environmental condition and thus, there have been conflicting past reports on the mechanism of disease transmission from seed to foliage. Seedborne late blight inoculum can result in poor stand/emergence. And, at times seedborne sources can create hot spots or disease foci in fields. However, seedborne sources can also infect shoots internally via mycelia and lesions may not be evident on lower stems. In this scenario, sporadic lower stem sporulation can occur 'under the radar' creating spores which then infect foliage giving the appearance of a 'top down' or 'spore shower' inoculation event. While the incidence of this happening is probably very low (as referenced in Johnson's work below), just a few infected/sporulating plants are still very biologically relevant in initiating an epidemic. Past research has shown that variable symptoms and field signatures can result from infected seed depending upon timing of infection/inoculation, environmental conditions, and strain of the pathogen. Further complicating things are field factors like soil type, planting depth, whole vs. cut seed status, and pesticide inputs. In sum, we can try to piece together a story of how the late blight pathogen got into a production field – and this is a useful exercise to better manage the disease within that field and others – but we may not come to a certain conclusion. http://www.potatogrower.com/uploads/6244.pdf

We are working on characterizing the strain/genotype of the late blight pathogen in partnership with Dr. Bill Fry of Cornell Univ.. I will keep our growers informed of this information as we learn more.

Previously shared info on fungicide selections for conventional and organic systems can be found at my website at:
http://www.plantpath.wisc.edu/wivegdis/

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