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Giant Ragweed Resistance to Glyphosate in Wisconsin

Dave Stoltenberg (Weed Scientist, Dept. of Agronomy, UW-Madison), Melinda Yerka and Courtney Glettner (Graduate Research Assistants, Dept. of Agronomy, UW-Madison), Jim Stute (Crops and Soils Educator, Rock County, UW-Extension), Tim Trower (Senior Outreach Specialist, Dept. of Agronomy, UW-Madison)

Giant ragweed (*Ambrosia trifida*) with resistance to glyphosate has been confirmed in several Midwest states, including our neighboring states of Minnesota and Iowa. In Minnesota, as well as Ohio, giant ragweed populations have evolved resistance to more than one herbicide mode of action (i.e. multiple resistance), specifically, resistance to glyphosate and ALS (acetolactate synthase) inhibitors.

As reported at the 2012 Wisconsin Crop Management Conference in January, our research has confirmed giant ragweed with resistance to glyphosate in Rock County, Wisconsin. This giant ragweed population was identified in a typical corn and soybean cropping system with a history of glyphosate use for weed management. We found resistant plants to have more than nine-fold resistance to glyphosate compared to plants susceptible to glyphosate. The glyphosate-susceptible plants used in our research were from seeds collected on the same farm where resistant plants were identified. This level of resistance means that plants in a resistant population can survive glyphosate applied at rates much higher than would normally be lethal to susceptible plants (Figure 1). Although the glyphosate-resistant plants may show injury symptoms, we've observed that they typically survive treatment, continue to grow, mature, and produce seeds.

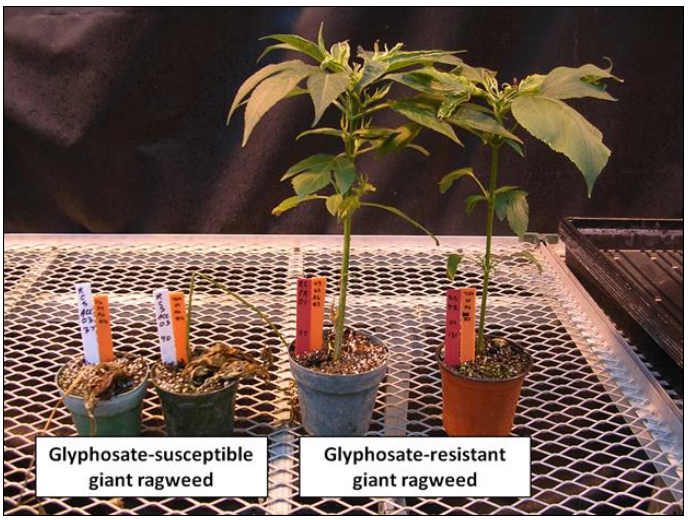

Figure 1. Rock County giant ragweed 4 weeks after treatment with 3.0 lb ae/glyphosate under greenhouse conditions at UW-Madison.

Preliminary results suggest that resistance of this Rock County giant ragweed population is due to an altered enzyme target site, such that glyphosate is less effective in inhibiting activity of this enzyme. Our research also suggests that glyphosate-resistant plants were not resistant to ALS-inhibiting herbicides (e.g. cloransulam).

These findings represent the first confirmed case of weed resistance to glyphosate in Wisconsin. What can we learn from these findings? First, glyphosate and glyphosate-resistant crops are valuable technologies to many growers in Wisconsin, and are utilized on millions of acres. This means that there is wide-spread selection for weed resistance to glyphosate. Second, to protect the long-term value of these technologies, we need to implement proactive weed management practices that reduce the risk of selecting for glyphosate-resistant weeds (as well as resistance to other herbicide modes of action). Several best management practices for reducing the risk of weed resistance to herbicides have recently been put forward by the Weed Science Society of America (www.wssa.net/Weeds/Resistance/index.htm). The strategy is to consider utilization of all cultural, mechanical, and herbicide

options available for effective weed control in each management situation:

1. Understand the biology of the weeds present.
2. Use a diversified approach to weed management focused on preventing weed seed production and reducing the number of weed seeds in the soil seedbank.
3. Plant into weed-free fields and then keep fields as weed free as possible.
4. Plant weed-free crop seed.
5. Scout fields routinely.
6. Use multiple herbicide mechanisms of action that are effective against the most troublesome or herbicide-resistance-prone weeds.
7. Apply the labeled herbicide rate at recommended weed sizes.
8. Emphasize cultural practices that suppress weeds by utilizing crop competitiveness.
9. Use mechanical and biological management practices where appropriate.
10. Prevent field-to-field and within-field movement of weed seed or vegetative propagules.
11. Manage weed seed at harvest and post-harvest to prevent a buildup of the weed seedbank.
12. Prevent an influx of weeds into the field by managing field borders.

Our current research is investigating other instances of suspected giant ragweed resistance to glyphosate and ALS-inhibiting herbicides. These best management practices should be promoted and used to reduce the likelihood of further cases of weed resistance to herbicides from occurring in Wisconsin. Weed resistance to glyphosate and other herbicides will be discussed at the Pest Management Field Day on July 11 at the UW-Arlington Agricultural Research Station. For more information on the field day see http://ipcm.wisc.edu/blog/2012/05/2012-pest-management-field-day/.

Can plant tissue testing be used to adjust N fertilizer rates for corn?

Carrie Laboski and John Peters, Extension Soil Scientists

There has been recent interest among producers and agronomists to use corn plant tissue testing to adjust sidedress N fertilizer rates. The challenge with this strategy is that plant tissue testing has not been calibrated to make recommendations for sidedress N application in Wisconsin.

Plant tissue testing was developed as a means to help diagnose problem areas in fields. The sufficiency ranges for each nutrient are guidelines to suggest whether or not the plant has already taken up adequate levels of a specific nutrient for a particular growth stage. Soil test levels, environmental conditions, and hybrid can affect tissue nutrient concentrations and make exact interpretation of tissue test results challenging.

A whole plant corn sample collected when the plants are 12 inches tall and analyzed for total N content will only give an indication of N availability to that point in the growing season. It is not predictive of how much N will continue to be available to the crop. For example, if a field has not received manure in several years, the previous crop was corn, and the only N applied was 20 lb N/a in starter fertilizer, it is possible for a tissue test of 12 inch-tall corn to come back in the sufficient range. However, should this be interpreted that no sidedress N is needed? The answer is no. Failure to apply N in this situation will likely result in reduced yields and profitability in most years.

The presidedress soil nitrate test (PSNT) is a useful tool for adjusting sidedress N application rates. The PSNT is a 12-inch soil sample that is taken when the corn is about 12 inches tall. The PSNT provides a measure of how much soil and manure/legume N has mineralized to that point in the growing season. The PSNT results can then be used to determine a N credit that can be subtracted from the targeted N application rate. The PSNT can be used to confirm forage legume and manure N credits. It is not recommended for use on sand and loamy sand soils or where more than 20 lb N/a in starter fertilizer was applied. In addition, the PSNT is not meant to verify the efficacy of preplant fertilizer N applications. For more information on the PSNT please see: UWEX publication A2809 (http://learningstore.uwex.edu/Nutrient-Application-Guidelines-for-Field-Vegetable-and-Fruit-Crops-in-Wisconsin-e-file-P1484.aspx).

Vegetable Crop Update 6/21/12

The 13th issue of the Vegetable Crop Update is now available. This issue contains information on the potato crop and irrigation. Click here to view this issue.

Variegated Cutworm Update

Bryan Jensen (IPM Program), Eileen Cullen (Dept. of Entomology)

The calls and emails continue to come regarding variegated cutworm damage. This has been, to say the least, an unexpected and unprecedented infestation and certainly warrants scouting. Variegated cutworms are routinely observed in several crops and ornamentals but not to the level of damage seen this growing season. Reports of damage have been from all areas of the state, on several crops and the larvae are variable in size. Careful scouting over the next few weeks and perhaps the rest of the growing season will be important.

Reports on alfalfa have come from both new seedings and established stands. Harvest would be your first control option if second crop is ready. If harvest is not an option, an applicable economic threshold would be 2 larvae/square foot. Larvae may be difficult to find during the day. Check under leaf/stem litter and look in soil cracks. We've even had consultants indicate they will crawl in worm holes and a shovel was useful for detection. Once the alfalfa is harvested, windrows provide excellent cover and may increase survival if the weather is hot and dry. Be sure to check all these areas to

confirm their presence before spraying. Lack of regrowth could also be from dry weather the southern part of the state has been experiencing.

Several damage reports have also come from soybeans and range from light defoliation to almost complete consumption of seedling plants that includes loss of all growing points. Some injury has resulted from larvae migrating out of adjacent crops and other infestations have been spotty within a field. In those situations, spot spraying may be an option. Consider treating entire fields if you have an average of 40% defoliation prior to flowering.

Reports have also come from field and sweet corn, however, those reports are limited and not as severe. Late planted field and sweet corn are certainly fields to watch closely for defoliation and perhaps stand loss.

Variegated cutworm larvae will range in size from 1 ½ to almost 2 inches in length prior to pupating and can be a good indication that feeding will soon subside. However, we've had reports and samples of larvae that are approximately one half grown and/or populations that have mixed sizes. Best efficacy will come when larvae are small. Continue to check for variegated cutworm larvae and damage.

We are likely to see future generations as the summer progresses. However, it is unpredictable if these generations will cause similar problems as what we are seeing now. Often predators, parasitoids and diseases may help control populations.

For more information on please see last week's article on variegated cutworms.

Wisconsin Pest Bullein 6/21/12

A new issue of the Wisconsin Pest Bulletin from the Wisconsin Department of Agriculture, Trade and Consumer Protection is now available. The Wisconsin Pest Bulletin provides up-to-date pest population estimates, pest distribution and development data, pest survey and inspection results, alerts to new pest finds in the state, and forecasts for Wisconsin's most damaging plant pests.

Issue No.11 of the Wisconsin Pest Bulletin is now available at:

http://datcpservices.wisconsin.gov/pb/index.jsp

http://datcpservices.wisconsin.gov/pb/pdf/06-21-12.pdf

Plant Disease Diagnostic Clinic (PDDC) Update

Brian Hudelson, Ann Joy, Amanda Zimmerman, Adam Greene, Andrew Pape, Plant Disease Diagnostics Clinic

The PDDC receives samples of many plant samples from around the state. The following diseases/disorders have been identified at the PDDC from June 8 through June 15, 2012:

PLANT/SAMPLE TYPE	DISEASE/DISORDER	PATHOGEN	COUNTY
FIELD CROPS			
Oats	Red Leaf	Barley Yellow Dwarf Virus	Outagamie
FORAGE CROPS			
Alfalfa	Downy Mildew	*Peronospora trifoliorum*	Sauk
FRUITS			
Apple	Apple Scab	*Venturia inaequalis*	Waukesha
	Fire Blight	*Erwinia amylovora*	Rock
VEGETABLES			
Tomato	Bacterial Spot	*Xanthomonas campestris* pv. *vesicatoria*	Rock

For additional information on plant diseases and their control, visit the PDDC website at pddc.wisc.edu.