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Giant Ragweed with Suspected Glyphosate Resistance

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Biotypes of nine weed species have been documented as glyphosate resistance in the U.S. However, glyphosate-resistant weeds have not been OFFICIALLY confirmed in Wisconsin. This article reports on a giant ragweed population that is being investigated for potential glyphosate-resistance. Note that glyphosate-resistance is not new in giant ragweed as six other states in the Midwest have already reported giant ragweed with glyphosate resistance. What is important in this case is 1) this serves as a reminder that the threat of glyphosate resistance is real in Wisconsin (it's not always going to be someone else's problem); 2) diverse weed management programs are warranted to reduce risk of resistance; and 3) when poor weed control occurs, resistance should be considered along with other causes of performance problems.

This field was reported in 2008 when a small number of giant ragweed plants survived two applications of glyphosate in soybean. The first application contained 1.1 lb ae/a glyphosate and the second contained 1.15 lb ae/a. (1.1 lb/a = 1.5 qt/a of generic or 33 oz/a of PowerMax). Several plants that survived were between the soybean rows suggesting that poor spray interception was not a problem. Some plants regrew from lower nodes on the stem after being sprayed whereas others were stunted and then the main shoot continued to grow. These symptoms showed the plants were sprayed and did not emerge after the application. Seeds were collected from several of the plants for greenhouse testing.

The seeds from each plant were kept separate, were cold treated to break their dormancy, and were planted in the greenhouse. Many seedlings grew and were sprayed with 1.5 lb ae/a glyphosate. All of the plants were damaged by the glyphosate, but some survived, especially seedlings from a couple parent plants. Unfortunately, the giant ragweed seed collected from Arlington that was to be used as a sensitive check did not grow. Therefore, I did not have sensitive plants to determine how well the glyphosate worked in the greenhouse. It seemed that the seedlings from some parent plants were more tolerant to the glyphosate than others. This test did not confirm resistance.

Because this test was not conclusive, a field test was conducted this spring in the field immediately adjacent to the 2008 field. Glyphosate was sprayed at 0.75, 1.5, 2.25, and 3.0 lb ae/a (equivalent to 1 qt/a to 1 gal/a of a generic) in 10 by 30 ft plots with four replications. Most giant ragweed were 6 to 8 inches tall when sprayed. Two weeks after spraying, all plants were dead except for some plants in a 50 by 30 ft area. The standard 0.75 lb/a glyphosate rate killed all the ragweed except for plants in this area (Figure 1). However, many plants survived 0.75 lb/a in this area (Figure 2) and a few plants survived rates up to 3.0 lb/a (Figure 3) at 2 weeks after spraying. We are monitoring the fate of these plants, but several appear to be growing.

Figure 1. Giant ragweed was controlled at 2 weeks after being sprayed with 0.75 lb ae/a glyphosate in most areas of the trial.

Figure 2. Giant ragweed with suspected glyphosate was damaged but not controlled at 2 weeks after being sprayed with 0.75 lb ae/a glyphosate in one area of the trial.

Figure 3. A few giant ragweed with suspected glyphosate were severely damaged but not killed at 2 weeks after being sprayed with 3.0 lb ae/a glyphosate in one plot of the trial.

At this time, I can only conclude that these giant ragweed are suspected of being glyphosate resistant because I did not officially compare them to a sensitive giant ragweed population. I know that they were sprayed (no spray skips and they didn't emerge after spraying); weather conditions were favorable, weed size was not excessive, and the glyphosate was effective on a majority of the ragweed plants.

One point that these photos illustrate with glyphosate resistant plants (if confirmed) is that glyphosate resistant weeds have a lower level of resistance than most other cases of resistance. For instance, triazine or ALS resistant weeds are almost immune to injury from the herbicide because of the high level of resistance, but glyphosate resistant weeds are often damaged and then regrow. This creates the problem that glyphosate resistance is harder to distinguish from other causes of poor glyphosate performance. Causes of poor control or escapes include spray skips, low rates, too large of weeds, weeds under the canopy, weeds emerged after spray application, rainfall too soon after application, dusty leaves, spraying early or late in the day, etc. You can review factors that affect glyphosate performance in at the Glyphosate, Weeds and Crops website http://www.glyphosateweedscrops.org/ Look for the "Understanding Glyphosate to Increase Performance" bulletin (click **Available** to open the bulletin list). If resistance is suspected, you will also want to search for evidence of resistance. Some standard features of herbicide resistant weeds are:

A single weed species escaped controlled, but this weed should have been controlled by the herbicide. A few cases exist where more than one herbicide resistant weed species exists in a field, but this is unlikely when resistance is first discovered. Rule out weeds that have natural tolerance to glyphosate such as yellow nutsedge or field horsetail.

- Dead weeds mixed with live weeds which indicate the herbicide was applied to the escaping weeds.
- The field has a history of repeated use of the same herbicide mode of action (check spray records for herbicide history).
- Poor performance was noted in the same area in previous years or resistance exists in the local area.
- No known application errors, weather conditions, or large weed size to explain the lack of control.

If you strongly suspect glyphosate resistance and are seeking management options OR if you are seeking management options to diversify your program, please see the bulletins on giant ragweed, waterhemp, horseweed, and common lambsquarters on the Glyphosate, Weeds and Crops website http://www.glyphosateweedscrops.org/ Click **Available** to open the bulletin list. The management recommendations are at the end of each bulletin.

PSNT – does it mean anything this year?

Carrie Laboski, Extension Soil Scientist

Over the past week I've received a few inquiries regarding the validity of the pre-sidedress nitrate test (PSNT) for corn this year considering the cool weather this spring. This is a very valid question for many in Wisconsin. To answer it, we'll look at research results and weather summaries.

The accuracy of the PSNT to predict N credits was assessed using data from 101 corn N rate response studies conducted throughout Wisconsin from 1989-1999. These data showed that on 59 % of the sites the PSNT underpredicted N credits from manure and legumes when the average May-June air temperature was more than 1°F below normal. Underpredicting N credits means that using the PSNT in this situation would have resulted in more N fertilizer being applied than was needed. The underprediction of N credits in cool springs is a result of slow early season N mineralization prior to PSNT sampling, followed by a typical flush of N mineralization once

Table 1. Air temperature departure from normal for selected Wisconsin cities.

City	Average weekly air temperature departure from normal* for the week ending						Average air temperature departure from normal
	10-May	17-May	25-May	31-May	7-Jun	14-Jun	3-May – 14 Jun
Eau Claire	4	-3	4	-3	-6	-8	-2.0
Green Bay	5	-4	2	-5	-7	-7	-2.7
La Crosse	3	-4	3	-4	-5	-8	-2.5
Madison	5	-1	4	-2	-5	-3	-0.3
Milwaukee	7	0	5	-3	-7	-6	-0.7

* Normal based on 1971-2000 data.

Source: Wisconsin Crop Progress (http://www.nass.usda.gov/Statistics_by_State/Wisconsin/Publications/Crop_Progress_&_Condition/index.asp)

the soil warms up, ultimately resulting in more N being available for the crop than the PSNT predicted. It should be noted that when the average May-June air temperature was more than 1°F below normal, the PSNT accurately predicted N credits on 37% of the sites and over predicted N credits on 4 % of the sites.

So the question now is: How cold has it been? Using the departure from normal of the weekly average air temperature data published in the Wisconsin Crop Progress report we can see that it has been a cool spring. Table 1 shows the weekly departures for five cities in Wisconsin and the average of those departures from May through June. Air temperatures in May and June in Central and Northern Wisconsin are more than 2°F below normal, while portions of Southern Wisconsin are nearing the 1°F below normal threshold.

Thus for Central and Northern Wisconsin we can expect that the PSNT results will be low and result in a low N credit. In these locations, a better N credit may be obtained this year by using book value N credits for manure and legumes. For more information on book value N credits, consult your local County Extension Agent and/or Chapter 9 *in Nutrient application guidelines for field, vegetable, and fruit crops in Wisconsin* (UWEX publication A2809; http://learningstore.uwex.edu/Nutrient-Application-Guidelines-for-Field-Vegetable-and-Fruit-Crops-in-Wisconsin-P185C0.aspx).

Based on past research and the current spring's weather, the PSNT should perform adequately in Southern Wisconsin. If there is concern about the PSNT underpredicting N credits in Southern Wisconsin, then delaying PSNT sampling by a week or two, compared to normal, will allow more time for the soil bacteria to mineralize N and potentially reduce the risk of the PSNT underpredicting N credits.

Wisconsin Vegetable Crop Update, 2009-1

Alvin J. Bussan, Potato and Vegetable Cropping Systems Specialist, UW-Madison, Department of Horticulture

Vegetable Crop Update newsletter issue one is out! This marks the first newsletter of the 2009 year. Weekly updates should be available as disease, insect, weed, fertility, and crop progress changes.

Upcoming events include:

Friday, July 17, 2009 – Lelah Starks Foundation Seed Farm Tour, Rhinelander

Thursday, August 6, 2009 – Potato Field Day, Hancock Ag Research Station

Friday, August 7, 2009 – Langlade Co. Potato Field Day, Antigo

The first issue has been posted on the IPCM web site on a new page titled appropriately : The Vegetable Crop Update page. Look for a new menu item under "WCM-News" to find this page, or click here : http://ipcm.wisc.edu/WCMNews/VegCropUpdate/tabid/115/Default.aspx

UW-Extension/Madison Plant Disease Diagnostic Clinic (PDDC) Update

Brian Hudelson, Ann Joy, Amy Gibbs, and Brooke Weber,
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 since June 10, 2009

PLANT/SAMPLE TYPE	DISEASE/DISORDER	PATHOGEN	COUNTY
FRUIT CROPS			
Apple	Phomopsis Canker	*Phomopsis* sp.	Richland
	Sphaeropsis Canker	*Sphaeropsis* sp.	Richland
Peach	Bacterial Canker	*Pseudomonas* sp.	Dane
	Cytospora Canker	*Cytospora* sp.	Dane
	Phomopsis Canker	*Phomopsis* sp.	Dane
Plum	Plum Pockets	*Taphrina communis*	Green
SOILS			
Alfalfa Soil	Aphanomyces Seedling Blight	*Aphanomyces euteiches* race 2	Fond du Lac, Goodhue (MN)
VEGETABLES			
Cucurbits (Miscellaneous)	Growth Regulator Herbicide Damage	None	Dane

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