



Northern NY Agricultural Development Program 2019-2020 Project Report

One- and Two-Pass Weed Control Programs for Glyphosate-Resistant Soybeans

Project Leader:

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Background:

Glyphosate-resistant (GR) soybeans made post-emergence weed control relatively easy with a single application. The use of post-emergence (POST) glyphosate in GR soybeans has been the primary weed control program used by many Northern New York (NNY) soybean growers. While this system seemed to simplify weed management, relying on total post-emergence programs can be difficult to manage if not properly implemented. The benefits of early season weed control to protect the crop yield can be lost if the single POST application of glyphosate is delayed. A single POST glyphosate application also puts considerable selection pressure in weed populations increasing the chances of developing GR weed populations in NNY. In recent years, multiple resistant horseweed (a.k.a marestail) has been found in New York State and has quickly become a troublesome weeds for many growers. Suspected glyphosate-resistant tall waterhemp and palmer amaranth weed populations have also been found in NYS.

The spread of multiple resistant marestail moving across the state, including in Northern New York, is forcing many growers to change their current herbicide programs. This has led to a renewed interest in and need to use soil-residual herbicides for improved soybean weed control.

There are several newer pre-emergence (PRE) residual herbicides with different sites of action than glyphosate (Group 9) that have the potential to help manage weeds in soybeans. Among them are Warrant (Group 15), Warrant Ultra (Group 14 and 15), Surveil (Group 2 and 14), and Trivence WDG (Group 2, 5, 14).

Soybean growers also have many older PRE residual herbicides to use. Our older soybean herbicides include Python WDG (Group 2), Valor SX (Group 14), Linex 4L (Group 7), Dual II Magnum (Group 15), metribuzin (Group 5), Pursuit (Group 2), Prowl (Group 3), and Prefix Group 14 and 15).

Also included in this trial were two herbicides containing the active ingredient sulfentrazone: Authority Elite (Group 14 and 15) and Spartan Charge (two Group 14s), which are not currently registered for use in soybeans in New York. These and other residual herbicides play an important role in GR soybean weed control programs, while helping slow the development of glyphosate-resistant weed populations in NNY.

Two-pass herbicide programs would provide better weed control and more flexibility in the timing of the POST glyphosate-only applications. Knowing that soybean growers prefer one-pass herbicide programs, we felt it was important to include total POST herbicide programs in this trial.

Well-informed development and evaluation of several herbicide programs will help NNY soybean growers make informed decisions about their weed control systems, while reducing the likeliness of specific herbicide-resistant weed species. Varying weed control programs with residual herbicides that use different modes of action can preserve the effectiveness of new seed traits, as well as the new herbicide products designed to work with them.

Methods:

A replicated herbicide trial was conducted on a farm near Watertown, New York, in Jefferson County. This trial included 28 different herbicide programs consisting of PRE, planned two-pass, and total POST application timings.

PRE treatments were applied on June 9, 2019, and visual weed control ratings were done 30 and 60 days after application (DAA).

The total POST treatments were applied on July 3, 2019, and weed control ratings were made 36 DAA.

The planned two-pass program PRE treatments were done on June 9, 2019, followed by the POST treatments on July 15, 2019, and the weed control ratings done 24 days after

the POST application. Redroot pigweed and common lambsquarters were the dominant weeds, however, large crabgrass was also present. These weed species were included in the control ratings for all treatment timings.

Results:

Weed control ratings taken 30 days after application of the PRE treatments applied June 9, 2019, showed greater than 90% control of common lambsquarters, redroot pigweed and large crabgrass shown in Table 1. The trial location received 1.63” precipitation total in the 7 days after PRE treatments were applied. This provided sufficient rainfall to activate the soil-applied preemergence herbicides in the trial.

Our control ratings 60 DAA of the PRE treatments for the large crabgrass were at least 85% control or better. Four of the top large crabgrass PRE treatments included Prefix (100% control), Dual II Magnum + Python WDG + Tricor DF (99% control), Boundary 7.8EC + Prowl H20 (99% control), and Authority Elite + Tricor DF (98.5% control) shown in Table 1.

All PRE treatments of the redroot pigweed exceeded 98% control 30 DAA. At 60 DAA, all PRE treatments exceeded 85% control with the exception of Linex 4L + Tricor DF (78.25% control) shown in Table 1.

All PRE treatments for common lambsquarters were greater than 90% 30 DAA. At 60 DAA all PRE treatments provided greater than 85% control, except with Dual II Magnum + Linex 4L (85% control), Dual II Magnum + Python WDG + Tricor DF (82.5% control), Linex 4L + Tricor DF (82.5% control), and Valor SX + Tricor DF (81% control) shown in Table 1.

It is worth noting that Tricor DF (metribuzin) is a triazine herbicide and will not provide control of triazine-resistant common lambsquarters. When Tricor DF was included in the treatments it did not improve the common lambsquarters control. This would indicate that we had triazine-resistant lambsquarters population at this location. Also, Dual II Magnum does not have activity on common lambsquarters.

The four planned two-pass programs provided 98% or greater control of all weeds when evaluated 24 DAA of the POST treatment shown in Table 2.

While the overall soybean yields of the treatments were not evaluated at this trial, the planned two-pass programs provided season-long control with little to no weed interference through the growing season. These programs are more expensive than most of the one-pass treatments evaluated; however, excellent weed control is a major factor contributing to overall yield.

The three total POST treatments all provided greater than 85% control of all weeds when evaluated 36 DAA. Outlook + Pursuit + Roundup PowerMax and the Warrant + Roundup PowerMax + XtendiMax provided greater than 95% control 36 DAA (Table 3). The Roundup PowerMax treatment provided adequate control of the weeds; however, the use of just glyphosate alone would not control any glyphosate-resistant weeds if they were present nor is this good herbicide resistance management stewardship.

Table 1. Weed control ratings 30 days after application of PRE treatments applied June 9, 2019, One- and Two-Pass Weed Control Programs for Glyphosate-Resistant Soybeans, NNYADP

PRE	Rate	Timing	SOA [^]	Lg Crab % Control ¹ 30 DAA ²	RR Pig % Control ¹ 30 DAA ²	Com LQ % Control ¹ 30 DAA ²	Lg Crab % Control ¹ 60 DAA ²	RR Pig % Control ¹ 60 DAA ²	Com LQ % Control ¹ 60 DAA ²
Untreated Check				0c	0b	0b	0d	0c	0d
Dual II Magnum	1.5 pt	PRE	15	97ab	99.75a	97.75a	96.5ab	93a	87.5abc
Python WDG	.89 oz.	PRE	2						
Dual II Magnum	1.5 pt	PRE	15	99.75ab	99.25a	99a	99a	90ab	82.5bc
Python WDG	.89 oz.	PRE	2						
Tricor DF	4 oz.	PRE	5						
Dual II Magnum	1.5 pt	PRE	15	100a	100a	95.5a	98ab	95a	85bc
Linex 4L	2 pt.	PRE	7						
Trivence WDG	6 oz.	PRE	2,5,14	97.75ab	100a	99.5a	85.5ab	99.5a	94.5ab
Valor XLT	3 oz.	PRE	2,14	97.5ab	99.75a	100a	81.5b	99a	97.75a
Valor SX	2 oz.	PRE	14	91.25b	99.25a	99.75a	61.25c	87.5ab	89.25abc
Valor SX	2 oz.	PRE	14	97.5ab	100a	98.25a	86.25ab	90.5ab	81c
Tricor DF	5 oz.	PRE	5						
Spartan Charge	6.25 oz.	PRE	14, 14	98.75ab	99.75a	100a	92.5ab	96.25a	99.25a
Spartan Charge	6.25 oz.	PRE	14, 14	94.25ab	99.5a	100a	86.25ab	94.75a	99a
Tricor DF	5 oz.	PRE	5						
Authority Elite	26 oz.	PRE	14,15	99.75ab	100a	100a	98.5a	97.75a	99.75a
Tricor DF	5 oz.	PRE	5						
Prefix	2.75 pt.	PRE	14,15	100a	100a	97.75a	100a	99.25a	92abc
Linex 4L	2 pt.	PRE	7	99ab	98.5a	95.25a	87.75ab	78.25b	82.5bc
Tricor DF	4 oz.	PRE	5						
Warrant Ultra	48 oz.	PRE	14,15	99.5ab	100a	94.75a	96.75ab	98.5a	93abc
Tricor DF	5 oz.	PRE	5						
Warrant Ultra	48 oz.	PRE	14,15	99.75ab	99.75a	97a	96ab	97.75a	89.25abc
Roundup PowerMax	32 oz.	PRE	9						
Tricor DF	5 oz.	PRE	5						
XtendiMax	22 oz.	PRE	4						
Clasp	.75% v/v	PRE							
Warrant Ultra	48 oz.	PRE	14,15	94.25ab	100a	99.5a	87ab	100a	98.5a
Canopy	6 oz.	PRE	2,5						
Surveil	3.6 oz.	PRE	2,14	98ab	100a	100a	88.5ab	95a	95ab
Valor SX	2 oz.	PP	14	98.75ab	99.75a	98a	89.25ab	95.25a	88.5abc
Tricor DF	5 oz.	PP	5						
Prowl H2O	2.5 pt	PP	3						
Pursuit	4 oz.	PP	2	97.5ab	99.5a	97.75a	91ab	97.75a	91abc
Prowl H2O	2.5 pt.	PP	3						
Boundary 7.8 EC	2.1 pt.	PP	5,15	100a	99.25a	97.5a	99a	96.75a	94ab
Prowl H2O	2.5 pt.	PP	3						

¹Visual rating, means followed by the same letter are not significantly different (P=0.05, Tukey's HSD)

²Days After Application treatment evaluation

[^]SOA= Site of Action

Table 2. Data for 4 planned two-pass programs applied June 9 and July 15, 2019, for soybean weed control, One- and Two-Pass Weed Control Programs for Glyphosate-Resistant Soybeans, NNYADP.

Planned 2 Pass	Rate	Timing	SOA [^]	Lg Crab % Control ¹ 24 DAA ²	RR Pig % Control ¹ 24 DAA ²	Com LQ % Control ¹ 24 DAA ²
Untreated Check				0b	0b	0b
Boundary 7.8 EC	2.1 pt	PRE	5,15	100a	100a	98.75a
Flexstar GT	3.5 pt.	MPO	9,14			
AMS	2.5 lbs.	MPO				
NIS	.25% v/v	MPO				
Warrant Ultra	48 oz.	PRE	14,15	100a	100a	100a
Tricor DF	5 oz.	PRE	5			
Roundup PowerMax	32 oz.	MPO	9			
XtendiMax	22 oz.	MPO	4			
Clasp	.75% v/v	MPO				
Warrant Ultra	48 oz.	PRE	14,15	99a	99.75a	98a
Tricor DF	5 oz.	PRE	5			
Cobra	12.5 oz.	MPO	14			
AMS	2.5 lbs.	MPO				
COC	1.5 pt.	MPO				
Prefix	2 pt.	PRE	14,15	100a	100a	100a
Roundup PowerMax	22 oz.	MPO	9			
Synchrony XP	.375 oz.	MPO	2, 2			
AMS	2.5 lbs.	MPO				
Verdict	5 oz.	PP	14,15	99a	99a	98
Tricor DF	5 oz.	PP	5			
Prowl H2O	2.5 pt	PP	3			
Roundup PowerMax	22 oz.	MPO	9			
AMS	2.5 lbs.	MPO				

¹Visual rating, means followed by the same letter are not significantly different (P=0.05, Tukey's HSD)

²Days After Application treatment evaluation

[^]SOA= Site of Action

Table 3. Data for three total POST treatments applied on July 3, 2019, for soybean weed control, One- and Two-Pass Weed Control Programs for Glyphosate-Resistant Soybeans, NNYADP.

POST	Rate	Timing	SOA [^]	Lg Crab % Control ¹ 36 DAA ²	RR Pig % Control ¹ 36 DAA ²	Com LQ % Control ¹ 36 DAA ²
Untreated check				0c	0c	0b
Roundup PowerMax	22 oz.	EPO	9	96.0b	87.5b	96.0a
AMS	2.5 lbs.	EPO				
Outlook	16 oz.	EPO	15	99.75a	95.25a	98.5a
Pursuit	4 oz.	EPO	2			
Roundup PowerMax	22 oz.	EPO	9			
AMS	2.5 lbs.	EPO				
Warrant	48 oz.	EPO	15	97.0ab	97.25a	96.0a
Roundup PowerMax	32 oz.	EPO	9			
XtendiMax	22 oz.	EPO	4			
Clasp	.75% v/v	EPO				

¹Visual rating, means followed by the same letter are not significantly different (P=0.05, Tukey's HSD)

²Days After Application treatment evaluation

[^]SOA= Site of Action

Herbicide timing	Application Date
PRE	June 9th
EPO	July 3rd
MPO	July 15th

Outreach:

A field plot meeting sponsored by Cornell Cooperative Extension was held at the on-farm trial site on August 1, 2019.

The results from this on-farm research trial have been disseminated to crop growers, crop consultants, agribusinesses in Northern New York, and other areas across the state through newsletters and local crop grower meetings hosted by Cornell Cooperative Extension and agribusinesses.

For More Information:

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