

## Report to the Delaware Soybean Board

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### **Evaluation of tankmixtures with Liberty 280 for residual weed control.**

#### **Key Findings:**

- Reflex was the most effective tankmix partner with Liberty for control of Palmer amaranth (other herbicides tested were Dual Magnum, Outlook, Prowl H2O, Warrant, and Zidua)
- Reflex tankmixed with Liberty often caused more leaf burn than the other herbicides tested, but soybeans quickly recovered from the injury
- While all the herbicides tested caused some level of soybean leaf burn, yield was not reduced

Liberty Link soybean use has been increasing due to the presence of glyphosate-resistant Palmer amaranth and horseweed. Liberty 280 (glufosinate) is a broad-spectrum herbicide that provides effective control of these species, but does not provide residual control. Liberty 280 effectiveness is best when applied to weeds less than 3 inches, and this application timing maybe as much as two weeks before soybean canopy closure. As result, there is an opportunity for weeds to emerge after application and before canopy closure and a residual herbicide will reduce the likelihood of needing a second herbicide application. This study was conducted to evaluate the effectiveness and crop safety of potential herbicides for tankmixing with Liberty 280.

The experiment was conducted at the University of Delaware's Research and Education Center in both years. In 2014 the plots were conventional tilled in a field of loamy sand soil (79:14:7 sand:silt:clay), 1.4% o.m. and 6.1 pH; and 2015 the field was no-tillage planted into a desiccated rye cover crop with sandy loam soil (78:13:9 sand:silt:clay), 2.5% o.m. and 4.8 pH. The experiment was conducted as a randomized complete block design with 14 treatments and with three replications. Treatments were arranged as a factorial of residual herbicides tankmixed with Liberty 280 and the addition of ammonium sulfate. All herbicides were applied with 32 fl oz/A of Liberty 280, herbicide and rates are listed in Table 1. Treatments were applied with or without

ammonium sulfate; AMS rate was 10 lb/100 gal of spray solution. Irrigation was used to reduce moisture stress in 2014. Plots consisted of seven 15-in. rows, 25 ft. long. Soybeans ('Southern States LL-473N' and 'Dyna-Gro S45LL33' in 2014 and 2015, respectively) were planted May 19, 2014 and May 20, 2015 at 220,000 seeds/A in 2014 and 150,000 seeds/A in 2015. Treatments were applied 4 weeks after planting (WAP), each year. Applications were made with a tractor mounted, compressed air sprayer in 2014 and backpack CO<sub>2</sub> sprayer in 2015. Applications were made with 20 g/A, at 3 mph, and 11002 spray nozzles (Greenleaf AirMix), with 30 psi in 2014 and 40 psi in 2015. Plots were combined at crop maturity and final yield was determined as bu/A.

Leaf burn was highest with the Reflex treatments at over 23% leaf burn when rated 7 days after treatment (DAT) in both years (Table 1). All other treatments resulted in less than 13% leaf burn in 2014. In 2015, Outlook, Prowl H<sub>2</sub>O, and Zidua caused 14 to 18% leaf burn. No treatment was less than 7% for both growing seasons. Palmer amaranth control at 3 WAT was highest for Palmer amaranth at 93% in 2014. No other treatment resulted in more than 84% control. All treatments in 2015 were above 93% and there were no significant differences in the treatment. The higher ratings in 2015 were due to ~0.5 inches of rain the day after treatment to incorporate the herbicide and lower weed pressure than 2014. In 2014, 0.26 inches of rain fell 8 DAT and only 0.4 inches for 14 day after treatment.

When averaged across all herbicide combinations, the addition of AMS increased soybean leaf burn from 12 to 16% and increased Palmer amaranth control from 87 to 90%. No interaction was detected between AMS and herbicides.

In a separate field trial conducted with the same treatments but no soybean crop planted, Reflex provided the highest level of control at 97% (data not presented). No other treatment provided more than 85% control.

In a greenhouse trial with the similar treatments focusing on soybean injury, Reflex plus Liberty caused the most leaf burn at 6 DAT, with 11% and all other treatments were less than 3% (Table 2). By 14 DAT, Dual or Zidua (both with Liberty) had the most stunting of soybean plants ranging 11 to 13%, while all others, including Reflex had less than 6% stunting.

While Reflex caused more leaf burn than other herbicides included in this trial, the injury was temporary and did not cause a yield reduction. In addition, it was the most consistent herbicide tankmixed with Liberty for residual Palmer amaranth control. If one of the other herbicides are used, it is critical to irrigate shortly after planting to ensure maximum efficacy.

Table 1. Postemergence applications of Liberty 280 in combination with residual herbicides. Soybean leaf burn and Palmer amaranth control are reported.

Trt No.	Herbicide	Rate unit	Leaf burn (%) 7 DAT		Palmer amaranth control (%) 3 WAT		Yield Bu/A
			2014	2015	2014	2015	
1	Dual Magnum +Liberty 280	1 pt/A 32 fl oz/A	11 b	12 c	75 c	96 a	86.5 a
2	Zidua +Liberty 280	1 oz wt/A 32 fl oz/A	11 b	14 bc	81 b	98 a	86.4 a
3	Outlook +Liberty 280	12 fl oz/A 32 fl oz/A	12 b	15 bc	84 b	93 a	88.0 a
4	Prowl H2O +Liberty 280	1.5 pt/A 32 fl oz/A	9 bc	18 b	76 c	94 a	84.5 a
5	Warrant +Liberty 280	1.5 pt/A 32 fl oz/A	7 c	13 c	76 c	97 a	84.1 a
6	Reflex +Liberty 280	1 pt/A 32 fl oz/A	23 a	28 a	93 a	100 a	84.5 a
	LSD P=.05		3.17	4.58	3.41	9.32	12.92
	Standard Deviation		2.65	3.82	2.85	7.78	11.12
	CV		21.78	23.3	3.53	8.1	13.6
	Treatment Prob(F)		0.0001	0.0001	0.0001	0.6272	0.4825

Table 2. Greenhouse and field trial with Liberty 280 and various residual herbicides for soybean safety (greenhouse trial) and residual control (field trial).

Trt No.	Herbicide	Rate unit	Greenhouse		
			Leaf burn (%)		Stunting (%)
			6 DAT	14 DAT	14 DAT
1	Dual Magnum +Liberty 280	1 pt/A 32 fl oz/A	2 b	7 a	11 a
2	Zidua +Liberty 280	1 oz wt/A 32 fl oz/A	2 b	10 a	13 a
3	Outlook +Liberty 280	12 fl oz/A 32 fl oz/A	0 c	1 b	2 b
4	Prowl H2O +Liberty 280	1.5 pt/A 32 fl oz/A	--	--	--
5	Warrant +Liberty 280	1.5 pt/A 32 fl oz/A	0 c	0 b	1 b
6	Reflex +Liberty 280	1 pt/A 32 fl oz/A	11 a	11 a	6 ab
	LSD P=.05		6.5	5.2	9.9
	Standard Deviation		5.3	0.67	7
	CV		75.2	30.6	52.9
	Treatment Prob(F)		0.0002	0.0001	0.0169