

Evaluation of pendimethalin programs and glyphosate products for weed control in soybean at Rochester, MN in 2004. Breitenbach, Fritz R., Lisa M. Behnken, Kevin R. Griffin, and Kristal L. Schaufler. The objective of this trial was to evaluate pendimethalin programs and compare glyphosate products for weed control in soybean in southeastern Minnesota. The research site was a Lawler loam series containing 2.5% organic matter with a pH of 6.1 and soil test P and K levels of 42 ppm and 135 ppm, respectively. The area was fertilized with 3 T/A of lime in the spring. The previous crop was corn. The field was disked and field cultivated once prior to planting. The soybean variety, Golden Harvest 1961, was planted on May 26, 2004 at a depth of 1.5 inches in 30-inch rows at 150,000 seeds/A. A randomized complete block design with four replications was used. Preplant incorporated (PPI), preemergence (PRE), and postemergence (POST) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 29, July 12, and July 19. Application dates and environmental conditions as well as crop and weed stages are listed below.

Date	May 26	May 26	June 28
Treatment	PPI	PRE	POST
Temperature (F)			
air	56	58	71
Relative humidity (%)	64	62	45
Wind (mph)	13	13	13
Soil moisture	adequate	adequate	adequate
Soybean			
stage	seeded	seeded	V2
height (inches)	0	0	6.8
Giant ragweed			
weed density/ft <sup>2</sup>	--	--	4
height (inch)	--	--	5
Common lambsquarters			
weed density/ft <sup>2</sup>	--	--	6
height (inch)	--	--	1
Common waterhemp			
weed density/ft <sup>2</sup>	--	--	12
height (inch)	--	--	2.5
Giant foxtail			
weed density/ft <sup>2</sup>	--	--	25
height (inch)	--	--	5
Rainfall after application (inch)			
week 1	1.31	1.31	0.16
week 2	0.20	0.20	2.82
week 3	5.46	5.46	0.23

Soil applied imazethapyr & pendimethalin provided significantly better giant ragweed and common lambsquarters control than soil applied pendimethalin + dimethenamid-P and pendimethalin by itself. Soil applied pendimethalin + dimethenamid-P provided significantly better common waterhemp and giant foxtail control than soil applied imazethapyr & pendimethalin and pendimethalin by itself. Soil applied pendimethalin + dimethenamid-P provided significantly better giant ragweed and common lambsquarters control than soil applied pendimethalin by itself (Table 1.).

Two-pass programs (soil applied followed by post) generally provided similar weed control to the glyphosate standard. Exceptions to this were the pendimethalin / imazamox + acifluorfen treatment which resulted in significantly lower giant ragweed and giant foxtail control, and the imazethapyr & pendimethalin / bentazon + sethoxydim treatment which provided significantly better giant ragweed control on the July 12 rating than the glyphosate standard. This difference, however, did not carryover to July 19 rating. Common waterhemp control was also significantly lower with the imazethapyr & pendimethalin / bentazon + sethoxydim treatment than the glyphosate standard (Table 1.).

Soybean yield was significantly lower with two treatments. In the pendimethalin / imazamox + acifluorfen program, giant ragweed control was significantly less than other treatments resulting in greater weed competition and reduced yield. In the imazethapyr & pendimethalin / bentazon + sethoxydim program, common waterhemp control was significantly less than other treatments resulting in greater competition and reduced yield (Table 1.).

The comparison of ten glyphosate products resulted in minimal differences. Significant differences were observed in two of the glyphosate treatments; Touchdown Hi-Tech + AMS + NIS, and Roundup Original +AMS +NIS. On the July 12 common waterhemp rating, Touchdown Hi-Tech + AMS + NIS had significantly lower control than Touchdown Total + AMS, Touchdown IQ + AMS, GF-1279 + AMS, ClearOut 41 Plus + AMS, Buccaneer Plus + AMS, Roundup UltraMax + AMS, and Roundup WeatherMax + AMS. These differences were not measurable in the July 19 ratings for common waterhemp. Common waterhemp control was significantly lower on the July 12 rating with Roundup Original +AMS +NIS than Touchdown Total + AMS, ClearOut 41 Plus + AMS, and Roundup UltraMax + AMS. On the July 19 common waterhemp rating, Roundup Original +AMS +NIS had significantly lower control than the Touchdown Total + AMS and Roundup WeatherMax + AMS treatments. Roundup Original + AMS + NIS was significantly lower on the July 12 rating of common lambsquarters than Roundup WeatherMax + AMS. This difference was not observed in the subsequent July 19 rating. Soybean yield was statistically the same for all treatments, even with the slight differences in weed control (Table 2.). (University of Minnesota Extension Service, Regional Center, Rochester, MN)

Table 1. Performance of pendimethalin and glyphosate herbicide programs for weed control in soybean on June 29, July 12, and July 19 at Rochester, MN in 2004. (Breitenbach, Behnken, Griffin, and Schaufler).

Treatment	Rate	AMBTR control			CHEAL Control			AMATA control			SETFA control			Soybean yield
		6/29	7/12	7/19	6/29	7/12	7/19	6/29	7/12	7/19	6/29	7/12	7/19	
	(lb/A)	6/29 7/12 7/19 (%)			6/29 7/12 7/19 (%)			6/29 7/12 7/19 (%)			6/29 7/12 7/19 (%)			(bu/A)
<b>PPI / POST</b>														
Pendimethalin / imazamox + acifluorfen + NIS + AMS	1.28/0.031 + 0.125+0.25%+3.0	0	58	81	90	99	99	85	99	96	88	58	90	29
Pendimethalin / imazethapyr & glyphosate + NIS + AMS	1.28 / 0.058 & 0.752 + 0.25% + 3.0	0	89	96	91	98	99	81	97	96	86	99	99	41
Pendimethalin / imazethapyr & glyphosate + pyraclostrobin <sup>2</sup> + NIS + AMS	1.28 / 0.058 & 0.752 + 0.098 + 0.25% + 3.0	0	85	95	90	98	99	84	95	96	88	100	99	41
<b>PRE / POST</b>														
Pendimethalin + dimethenamid-P/ glyphosate <sup>1</sup> + NIS + AMS	0.475 + 0.59/ 0.56 + 0.25% + 3.0	23	92	98	96	98	97	99	98	98	94	99	98	42
Imazethapyr & pendimethalin / bentazon + sethoxydim + NIS + AMS	0.063&0.847 / 1.0 + 0.2 + 0.25% + 3.0	66	99	99	100	99	99	83	46	49	88	95	99	37
Glyphosate <sup>3</sup> + AMS	0.77 + 3.0	0	93	98	0	96	98	0	93	98	0	98	97	43
Untreated		0	0	0	0	0	0	0	0	0	0	0	0	16
LSD = (0.05)		8	5	3	1	4	2	4	4	3	2	2	2	3

Glyphosate<sup>1</sup> = Roundup Original, pyraclostrobin<sup>2</sup> = Headline fungicide, glyphosate<sup>3</sup> = Roundup WeatherMax, NIS = AGRI-DEX nonionic surfactant, Helena; and AMS = spray grade ammonium sulfate, Helena.

Table 2. Performance of glyphosate products applied with AMS and/or NIS for weed control in soybean on July 12 and July 19 at Rochester, MN in 2004 (Breitenbach, Behnken, Griffin, and Schaufler).

Treatment	Rate	AMBTR control		CHEAL control		AMATA control		SETFA control		Soybean yield
		7/12	7/19	7/12	7/19	7/12	7/19	7/12	7/19	
	(lb/A)	AMBTR control (%)		CHEAL control (%)		AMATA control (%)		SETFA control (%)		(bu/A)
<b>POST</b>										
Glyphosate <sup>4</sup> + AMS	0.78 + 3.0	91	97	94	97	96	98	99	96	40
Glyphosate <sup>5</sup> + NIS + AMS	0.78 + 0.25% + 3.0	90	96	93	97	85	96	98	96	43
Glyphosate <sup>6</sup> + AMS	0.75 + 3.0	91	97	93	97	93	97	98	96	42
Glyphosate <sup>7</sup> + AMS	0.75 + 3.0	91	97	93	97	91	97	99	97	42
Glyphosate <sup>8</sup> + AMS	0.75 + 3.0	91	97	91	97	93	97	98	96	41
Glyphosate <sup>9</sup> + AMS	0.75 + 3.0	92	97	95	97	94	97	99	97	41
Glyphosate <sup>10</sup> + AMS	0.75 + 3.0	90	96	93	97	92	96	98	97	41
Glyphosate <sup>1</sup> + NIS + AMS	0.75 + 0.25% + 3.0	91	96	90	98	87	93	98	97	42
Glyphosate <sup>11</sup> + AMS	0.76 + 3.0	93	97	94	97	96	97	98	97	41
Glyphosate <sup>3</sup> + AMS	0.77 + 3.0	93	98	96	98	93	98	98	97	43
Untreated		0	0	0	0	0	0	0	0	16
LSD = (0.10)		4	3	3	1	4	3	2	2	2

Glyphosate<sup>1</sup> = Roundup Original, Glyphosate<sup>3</sup> = Roundup WeatherMax, Glyphosate<sup>4</sup> = Touchdown Total, Glyphosate<sup>5</sup> = Touchdown HiTech, Glyphosate<sup>6</sup> = Touchdown IQ, Glyphosate<sup>7</sup> = GlyphoMax Plus, Glyphosate<sup>8</sup> = GF-1279, Glyphosate<sup>9</sup> = ClearOut 41 Plus, Glyphosate<sup>10</sup> = Buccaneer Plus, Glyphosate<sup>11</sup> = Roundup UltraMax, AMS = spray grade ammonium sulfate, Helena; and NIS = nonionic surfactant, Helena.