

Economics of Commercial Weed Control Programs in Soybean, 2007 Christy L. Sprague

A field trial in soybean was conducted in 2007 at the MSU Research Farm in E. Lansing to compare weed control, soybean injury, soybean yield, and economic returns of dominant weed control programs being marketed to Michigan growers. Each major herbicide company was asked to submit up to four weed control programs for the studies based on soil type and weed infestation history. Site characteristics and herbicide application timings are described in Table 1. Table 2 describes the herbicide programs selected by each company for 2007. Herbicide programs are sorted by application timing and the need for Roundup Ready seed. Yield loss due to weeds was extremely high. The maximum soybean yield was 50.7 bu/A and the weedy (untreated) yield was 6.3 bu/A, resulting in a yield loss of 44.4 bu/A (87.6%).

Within 5 days after planting and application of the preemergence herbicides the site received 0.75 inch of rainfall. This rainfall would have helped with the incorporation of the soil-applied herbicides. Table 3 contains the data for soybean injury, weed control, herbicide program costs, soybean yield, and economic returns.

Table1. Site description.

Crop	Soybean
Variety	Pioneer 91M91
Soil Texture	Loam
Soil pH	6.0
Soil Organic Matter	3.8
Dominant Weeds	SETFA, CHEAL, AMBEL, ABUTH, AMAPO
Planting Date	May 8
Application Timings:	
PRE	May 8
Early POST (EPOS)	June 9
Mid-POST (MPOS)	June 11
POST	June 18
Late-POST (LPOS)	July 2
Evaluation Times	55 d (soybean injury) 90 d (weed control)

Abbreviations: SETFA = giant foxtail, CHEAL = c. lambsquarters, AMBEL = c. ragweed, ABUTH = velvetleaf, AMAPO = pigweed (mixture of redroot & Powell).

Table 2. Commercial soybean herbicide programs selected by companies in 2007.

Conventional	Treatments (Rate/A)	Abbreviated Form
PRE	Sencor (6.4 oz) + Define (14 fl oz) + Pursuit (1 oz) Pendimax (2.4 pt) + Sonic (6 oz) Canopy (2.25 oz) + Linex (1 pt) + Cinch (1 pt) Sencor (5.28 oz) + Linex (1 pt) + Define (14 fl oz) Prefix (2 pt) + Boundary (1.25 pt)	Sencor + Define + Pursuit Pendimax + Sonic Canopy + Linex + Cinch Sencor + Linex + Define Prefix + Boundary
PRE/POST	Prowl H ₂ O (2.5 pt) fb. Raptor (4 fl oz) + Flexstar (12 fl oz) + MSO (1%) + AMS (2.5 lb) Envive (3.5 oz) fb. Flexstar (1 pt) + Assure II (8 fl oz) + COC (1%)	Prowl fb. Raptor + Flexstar (EP) Envive fb. Flexstar + Assure II (P)
Roundup Ready		
PRE/POST	Prowl H ₂ O (2.5 pt) fb. Extreme (3 pt) + Activator 90 (0.125%) + AMS (2.5 lb) Prowl H ₂ O (2.5 pt) fb. Buccaneer Plus (32 fl oz) + AMS (8.5 lb/100 gal) IntRRo (1.5 qt) fb. Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal) Sencor (5.28 oz) fb. Roundup OriginalMax (16 fl oz) + AMS (17 lb/100 gal) Sencor (8 oz) fb. Roundup OriginalMax (16 fl oz) + AMS (17 lb/100 gal) Authority First (3.2 oz) fb. Roundup WeatherMax (22 fl oz) + AMS (17 lb/100 gal) Prefix (2 pt) fb. Touchdown Total (24 fl oz) + AMS (17 lb/100 gal) Boundary (1.25 pt) fb. Touchdown Total (24 fl oz) + AMS (17 lb/100 gal)	Prowl fb. Extreme (EP) Prowl fb. Buccaneer (EP) IntRRo fb. RupOM (EP) Sencor (L) fb. RupOM (EP) Sencor (H) fb. RupOM (MP) Authority First fb. RupWM (MP) Prefix fb. Tdown (P) Boundary fb. Tdown (P)
POST (2-pass)	Roundup WeatherMax (22 fl oz) + AMS (17 lb/100 gal) - EPOS fb. LPOS Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal) - EPOS fb. LPOS Sequence (3.5 pt) + AMS (17 lb/100 gal) EPOS fb. Touchdown Total (24 fl oz) + AMS (17 lb/100 gal) LPOS Roundup OriginalMax (32 fl oz) + AMS (17 lb/100 gal) POST fb. Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal) LPOS	RupWM (EP) fb. RupWM (LP) RupOM (EP) fb. RupOM (LP) Sequence (EP) fb. Tdown (LP) RupOM (P) fb. RupOM (LP)

Table 3. Soybean injury, weed control, program costs, soybean yield, and economic returns for 19 herbicide programs in 2007.

Herbicide Programs	Soybean Injury (%)	SETFA	CHEAL	AMBEL ¹	ABUTH	AMAPO	All Weeds (≥90%)	Costs ² (\$/A)	Yield (bu/A)	Economic Returns ³ (\$/A)
PRE (Conventional)				% control						
Sencor + Define + Pursuit	3	96	99	54	99	99	NO	\$39.96	35.1	\$345.44
Pendimax + Sonic	2	67	99	23	99	99	NO	\$33.55	19.4	\$177.56
Canopy + Linex + Cinch	7†	91	99	30	99	99	NO	\$33.07	23.9	\$227.13
Sencor + Linex + Define	0	67	96	56	92	92	NO	\$31.50	31.6	\$313.53
Prefix + Boundary	0	96	96	85	99	99	NO	\$26.91	41.7	\$428.31*
PRE fb. POST (Conventional)										
Prowl fb. Raptor + Flexstar (EP)	18†	87	96	68	99	99	NO	\$50.67	41.5	\$401.55
Envive fb. Flexstar + Assure II (P)	10†	94	99	96	99	99	YES	\$47.12	47.7*	\$473.02*
PRE fb. POST (Roundup Ready)										
Prowl fb. Extreme (EP)	9†	96	99	86	99	99	NO	\$45.90	45.2*	\$446.69*
Prowl fb. Buccaneer (EP)	4	90	97	96	94	94	YES	\$38.73	48.1*	\$486.04*
IntRRo fb. RupOM (EP)	1	65	96	95	88	88	NO	\$38.55	45.5*	\$457.31*
Sencor (L) fb. RupOM (EP)	0	95	97	94	93	93	YES	\$33.78	50.7*	\$519.09*
Sencor (H) fb. RupOM (MP)	0	83	98	97	97	97	NO	\$36.24	44.9*	\$453.90*
Authority First fb. RupWM (MP)	0	92	98	96	98	98	YES	\$43.62	46.0*	\$458.24*
Prefix fb. Tdown (P)	0	98	99	99	99	99	YES	\$42.04	48.4*	\$485.74*
Boundary fb. Tdown (P)	3	84	96	97	98	98	NO	\$41.88	43.0*	\$427.52*
POST 2-pass (Roundup Ready)										
RupWM (EP) fb. RupWM (LP)	8†	98	99	99	99	99	YES	\$40.72	49.9*	\$503.42*
RupOM (EP) fb. RupOM (LP)	3	96	99	99	99	99	YES	\$37.22	49.4*	\$501.74*
Sequence (EP) fb. Tdown (LP)	8†	99	99	99	99	99	YES	\$54.49	46.9*	\$457.47*
RupOM (P) fb. RupOM (LP)	12†	87	98	98	98	98	NO	\$39.89	39.8	\$394.06
Untreated	0	0	0	0	0	0	NO	0	6.3	\$68.19

Abbreviations: SETFA = giant foxtail, CHEAL = common lambsquarters, AMBEL = common ragweed, ABUTH = velvetleaf, AMAPO = pigweed, fb. = followed by, EP = early POST, MP = mid-POST, P = POST, LP = late POST.

¹ A portion of the common ragweed population may have been resistant to ALS-herbicides.

² Herbicide and additive costs = avg. of price lists (April 2007); Application cost = \$6.00/A; Roundup Ready seed premium = \$11.96/A; seeding rate = 155,000 seeds/A. Weed control costs = Herbicide \$ + Additive \$ + Application \$ + seed premium \$ (where applicable).

³ Crop selling price = \$10.91/bu (December 2007). Economic return = (Yield x Price) – Weed Control Costs.

* Values are not significantly different from the highest value within that column.

† Indicates significant soybean injury 55 days after soybean planting.