

Economics of Commercial Weed Control Programs in Soybean, 2009 Christy L. Sprague

A field trial in soybean was conducted in 2009 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 2009. 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 78.2 bu/A and the weedy (untreated) yield was 38 bu/A, resulting in a yield loss of 40.2 bu/A (51 %).

Within 14 days after planting and application of the preemergence herbicides the site received 4.3-inches of rain. Most of this rain occurred in one rainfall event. As a result most soil-applied herbicides caused significant soybean injury. However, soybean outgrew most of this injury and it appeared that early soybean injury did not result in significant yield losses for most treatments. Table 3 contains the data for soybean injury, weed control, herbicide program costs, soybean yield, and economic returns.

Table 1. Site description.

Crop	Soybean
Variety	Pioneer 92M61
Soil Texture	Loam
Soil pH	6.6
Soil Organic Matter	3.3
Dominant Weeds	SETFA, CHEAL, AMBEL, AMAPO, ABUTH
Planting Date	May 18
Application Timings:	
PRE	May 18
Mid-POST (MPOS)	June 23
POST	June 25
Late-POST (LPOS)	July 20
Evaluation Times	Soybean injury – at POST Weed control August (56 d after POST)

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

Table 2. Commercial soybean herbicide programs selected by companies in 2009.

Conventional	Treatments (Rate/A)	Abbreviated Form
PRE	Canopy (2.25 oz) + Linex (1 pt) + Cinch (1 pt)	Canopy + Linex + Cinch
PRE/POST	Prowl H ₂ O (2 pt) fb. Raptor (4 fl oz) + Flexstar (10 fl oz) + COC (1%) + AMS (8.5 lb/100gal)	Prowl fb. Raptor + Flexstar (MP)
	Prowl H ₂ O (2 pt) + Pursuit (4 fl oz) fb. Flexstar (10 fl oz) + COC (1%)	Prowl + Pursuit fb. Flexstar (MP)
	Authority Assist (10 fl oz) fb. Flexstar (1 pt) + Select (6 fl oz) + COC (1%)	Auth Assist fb. Flexstar + Select (MP)
	Boundary (1.75 pt) fb. Flexstar (1 pt) + Fusion (8 fl oz) + COC (0.5%)	Boundary fb. Flexstar + Fusion (P)
Roundup Ready		
PRE/POST	Prowl H ₂ O (2 pt) fb. Roundup PowerMax (22 fl oz) + AMS (17 lb/100 gal)	Prowl fb. RupPM (P)
	Prefix (2 pt) fb. Touchdown Total (24 fl oz) + AMS (17 lb/100 gal)	Prefix fb. Tdown (P)
	Sonic (3 oz) fb. Durango DMA (24 fl oz) + AMS (17 lb/100 gal)	Sonic fb. Durango (P)
	Envive (2.5 oz) fb. Roundup PowerMax (22 fl oz) + AMS (17 lb/100 gal)	Envive fb. RupPM (P)
	Authority Assist (5 fl oz) fb. Roundup PowerMax (22 fl oz) + AMS (17 lb/100 gal)	Auth Assist fb. RupPM (P)
	Authority MTZ (12 oz) fb. Roundup PowerMax (22 fl oz) + AMS (17 lb/100 gal)	Auth MTZ fb. RupPM (P)
	IntRRo (2 qt) fb. Roundup PowerMax (22 fl oz) + AMS (17 lb/100 gal)	IntRRo fb. RupPM (P)
	Valor (2 oz) fb. Roundup PowerMax (22 fl oz) + AMS (17 lb/100 gal)	Valor fb. RupPM (P)
	Valor XLT (3 oz) fb. Roundup PowerMax (22 fl oz) + AMS (17 lb/100 gal)	Valor XLT fb. RupPM (P)
	Gangster (2.4 oz) fb. Roundup PowerMax (22 fl oz) + AMS (17 lb/100 gal)	Gangster fb. RupPM (P)
	Canopy (2.25 oz) fb. Roundup PowerMax (22 fl oz) + AMS (17 lb/100 gal)	Canopy fb. RupPM (P)
	Python (0.8 oz) fb. Durango DMA (24 fl oz) + AMS (17 lb/100 gal)	Python fb. Durango (P)
	Boundary (1.75 pt) fb. Flexstar GT (3 pt) + NIS (0.25%) + AMS (17 lb/100 gal)	Boundary fb. Flexstar GT (P)
POST (2-pass)	Sequence (2.5 pt) + AMS (17 lb/100 gal) fb. Touchdown Total (24 fl oz) + AMS (17 lb/100 gal)	Sequence (MP) fb. Tdown (LP)
	Touchdown Total (24 fl oz) + AMS (17 lb/100 gal) - MPOS fb. LPOS	Tdown (MP) fb. Tdown (LP)
	Roundup PowerMax (22 fl oz) + AMS (17 lb/100 gal) - MPOS fb. LPOS	RupPM (MP) fb. RupPM (LP)
	Flexstar GT (3 pt) + NIS (0.25%) + AMS (17 lb/100 gal) fb. Touchdown Total (24 fl oz) + AMS (17 lb/100 gal)	Flexstar GT (MP) fb. Tdown (LP)
	Durango DMA (24 fl oz) + FirstRate (0.3 oz) + AMS (17 lb/100gal) fb. Durango DMA (24 fl oz) + AMS (17 lb/100 gal)	Durango + FRate (MP) fb. Durango (LP)

Table 3. Soybean injury, weed control, program costs, soybean yield, and economic returns for 23 herbicide programs in 2009.

Herbicide Programs	Soybean						All Weeds (≥90%)	Costs ² (\$/A)	Yield (bu/A)	Economic Returns ³ (\$/A)
	Injury (%)	SETFA	CHEAL	AMBEL ¹	AMAPO	ABUTH				
PRE (Conventional)										
Canopy + Linex + Cinch	8†	61	99	15	99	99	NO	\$36.42	47.0	\$422.03
PRE fb. POST (Conventional)										
Prowl fb. Raptor + Flexstar (MP)	21†	88	97	84	99	99	NO	\$54.02	68.6	\$615.56
Prowl + Pursuit fb. Flexstar (MP)	16†	85	99	80	99	99	NO	\$53.37	69.7	\$626.19
Auth Assist fb. Flexstar + Select (MP)	16†	94	99	96	99	99	YES	\$62.92	76.8*	\$686.06*
Boundary fb. Flexstar + Fusion (P)	18†	98	97	86	99	99	NO	\$59.86	72.8	\$649.82
PRE fb. POST (Roundup Ready)										
Prowl fb. RupPM (P)	16†	96	95	99	99	99	YES	\$53.35	71.4	\$642.79
Prefix fb. Tdown (P)	15†	97	99	99	99	99	YES	\$56.71	77.7*	\$700.90*
Sonic fb. Durango (P)	13†	94	99	98	99	99	YES	\$55.79	78.2**	\$706.37**
Envive fb. RupPM (P)	30†	92	99	98	99	99	YES	\$53.12	74.6*	\$674.11*
Auth Assist fb. RupPM (P)	16†	93	99	98	99	99	YES	\$55.34	77.2*	\$696.87*
Auth MTZ fb. RupPM (P)	9†	93	99	99	99	99	YES	\$56.88	76.4*	\$688.26*
IntRRo fb. RupPM (P)	9†	92	93	96	99	99	YES	\$56.10	75.5*	\$680.02*
Valor fb. RupPM (P)	28†	90	99	98	99	99	YES	\$53.38	75.2*	\$679.70*
Valor XLT fb. RupPM (P)	30†	93	99	99	99	99	YES	\$54.48	73.4*	\$661.33*
Gangster fb. RupPM (P)	30†	86	98	97	99	99	NO	\$63.26	72.8	\$645.99
Canopy fb. RupPM (P)	1	91	99	99	99	99	YES	\$51.00	71.6	\$646.48
Python fb. Durango (P)	4	91	99	94	99	99	YES	\$52.18	73.4*	\$663.55*
Boundary fb. Flexstar GT (P)	11†	98	99	99	99	99	YES	\$69.08	74.0*	\$652.23
POST 2-pass (Roundup Ready)										
Sequence (MP) fb. Tdown (LP)	0	99	99	99	99	99	YES	\$62.99	74.9*	\$667.43*
Tdown (MP) fb. Tdown (LP)	0	99	99	99	99	99	YES	\$58.16	75.2*	\$674.60*
RupPM (MP) fb. RupPM (LP)	0	99	99	99	99	99	YES	\$57.74	77.8*	\$700.61*
Flexstar GT (MP) fb. Tdown (LP)	0	99	99	99	99	99	YES	\$65.65	72.8	\$644.66
Durango + FRate (MP) fb. Durango (LP)	0	99	99	99	99	99	YES	\$65.74	75.8*	\$673.26*
Untreated	0	0	0	0	0	0	NO	—	38.0	\$374.00

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

¹ A portion of the common ragweed population was resistant to ALS-herbicides.

² Herbicide and additive costs = avg. of price lists (May 2009); Application cost = \$7.00/A; Roundup Ready seed premium = \$15.00/A; seeding rate = 155,000 seeds/A. Weed control costs = Herbicide \$ + Additive \$ + Application \$ + seed premium \$ (where applicable).

³ Crop selling price = \$9.75/bu (December 2009). Economic return = (Yield x Price) – Weed Control Costs.

* Values are not significantly different from the highest value within that column. ** Highest yielding and highest economic returns.

† Indicates significant soybean injury 38 days after planting, soybean injury was negligible 100 day after planting.