

Economics of Commercial Weed Control Programs in Corn, 2009

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A field trial was conducted in corn in 2009 at the MSU Research Farm in East Lansing to compare weed control, corn injury, corn 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 glufosinate- or glyphosate-resistant seed. Within 2 days after planting and application of the preemergence herbicides the site received 0.97 inches of rain providing excellent activation of preemergence herbicides and providing a jump start to the corn. This study was planted early in the season, when most of the state was waiting to get into the field. The high level of moisture early in the season helped reduce the effects of early season weed competition. Yield loss due to weeds was minimal and was highest where grass weed competition was allowed through the season. The high levels of soil moisture resulted in excellent activity of residual herbicides early, however resulted in breaks in control later in the season with only four treatments providing greater than 90% control of all species in August. Treatments containing herbicides with a residual component did tend to yield among the highest. The maximum corn yield was 238 bu/A, and the weedy (non-treated) yield was 148 bu/A, resulting in a yield loss of 90 bu/A (38%). Table 3 contains the actual data for corn injury, weed control, herbicide program costs, corn yield, and economic returns. Overall there were few differences in treatments and, as the non-treated shows, there were optimal growth conditions for corn in this study.

Table 1. Site description.

Crop	Corn
Variety	Pioneer 37Y14 (RR/LL)
Soil Texture	loam
Soil pH	6.4
Soil Organic Matter	3.4
Dominant Weeds	SETFA, CHEAL, AMAPO, ABUTH
Number of Replications	6
Planting Date	May 7
Application Timings:	
PRE	May 8
Early POST (EP)	May 30
Mid-POST (MP)	June 5
Late-POST (LP)	June 15
Evaluation Time	7d after MP 77 d (weed control)

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

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

<i>Conventional</i>	<i>Treatments (Rate/A)</i>	<i>Abbreviated Form</i>	
PRE	BreakFree ATZ (2.6 qt)	BreakFree ATZ	
	Keystone (2.4 qt) + Hornet WDG (3 oz)	Keystone + Hornet	
	Lumax (2.5 qt) + Atrazine (1 qt)	Lumax + Atrazine	
	SureStart (2.5 pt) + Keystone (2 pt)	SureStart + Keystone	
PRE/MPOS	Bicep Lite II Magnum (1.5 pt) fb Impact (0.75 fl oz) + Atrazine (0.5 qt) + MSO (1 %) + UAN 28% (2.5 %)	Bicep Lt fb Impact + Atrazine	
	Guardzman Max (4 pt) fb Status (5 oz) + Activator 90 (0.25 %) + AMS (17 lb)	GMax fb Status	
MPOS	Harness Xtra 5.6 (2 qt) fb Yukon (4 oz) + Herbimax (1 %)	Harness Xtra fb Yukon	
	Capreno (3 fl oz) + Atrazine (0.5 qt) + Herbimax (1%) + UAN 28% (1.5 qt)	Capreno + Atrazine	
	Laudis (3 fl oz) + Atrazine (1 qt) + MSO (1 %) + UAN 28% (1.5 qt)	Laudis + Atrazine	
	Steadfast Q (1.5 oz) + Atrazine (1 qt) + Status (2.5 oz) + Herbimax (1 %) + AMS (2 lb)	Steadfast Q + Atrazine + Status	
<i>Liberty Link</i>			
PRE/LPOS	Atrazine (1.5 qt) fb Ignite (22 fl oz) + AMS (3 lb)	Atrazine fb Ignite	
POST (2-pass)	Ignite 280 (22 fl oz) + AMS (3 lb) – MP fb LP	Ignite fb Ignite	
<i>Roundup Ready</i>			
PRE/MPOS	Bicep II Magnum (1.1 qt) fb Halex GT (3.6 pt) + Atrazine (0.5 qt) + Activator 90 (0.25 %) + AMS (8.5 lb)	Bicep fb Halex	
	Bicep Lite II Magnum (1.5 pt) fb Impact (0.5 fl oz) + Roundup PowerMAX (22 fl oz) + Atrazine (0.5 qt) + AMS (17 lb)	Bicep Lt fb Impact + RupPM	
	Degree Xtra (2 qt) fb Roundup PowerMAX (22 fl oz) + AMS (17 lb)	Degree Xtra fb RupPM	
	Guardzman Max (2.5 pt) fb Status (2.5 oz) + Roundup PowerMAX (22 fl oz) + AMS (17 lb)	GMax fb Status + RupPM	
	Harness Xtra 5.6 (1.5 qt) fb Roundup PowerMAX (22 fl oz) + AMS (17 lb)	Harness Xtra fb RupPM	
	Harness Xtra 5.6 (1 qt) fb Yukon (4 oz) + Roundup PowerMAX (22 fl oz) + Activator 90 (0.125 %) + AMS (17 lb)	Harness Xtra fb Yukon + RupPM	
	Lumax (2 qt) fb Touchdown Total (24 fl oz) + AMS (8.5 lb)	Lumax fb Tdown	
	Parallel (1.5 pt) fb Roundup PowerMAX + (22 fl oz) + AMS (17 lb)	Parallel fb RupPM	
	Parallel (2 pt) fb Roundup PowerMAX + (22 fl oz) + AMS (17 lb)	Parallel fb RupPM	
	Parallel Plus (1.5 qt) fb Roundup PowerMAX + (22 fl oz) + AMS (17 lb)	Parallel Plus fb RupPM	
	Parallel Plus (2.3 qt) fb Roundup PowerMAX (22 fl oz) + AMS (17 lb)	Parallel Plus fb RupPM	
	Resolve (1 oz) + Atrazine (0.75 qt) fb Roundup PowerMAX (22 fl oz) + AMS (17 lb)	Resolve fb RupPM	
	SureStart (1.75 pt) fb Durango DMA (24 fl oz) + AMS (2 %)	SureStart fb Durango	
	Harness Xtra 5.6 (1 qt) fb Yukon (4 oz) + Roundup PowerMAX (22 fl oz) + Activator 90 (0.125 %) + AMS (17 lb)	Harness Xtra fb Yukon + RupPM	
	EPOS	Harness Xtra (1.5 qt) + Roundup PowerMAX (22 fl oz) + AMS (17 lb)	Harness Xtra + RupPM
	MPOS	SureStart (2 pt) + Durango DMA (24 fl oz) + AMS (2 %)	SureStart + Durango
	Halex GT (3.6 pt) + Atrazine (0.5 qt) + AMS (8.5 lb)	Halex + Atrazine	
	Prowl H2O (2 pt) + Status (2.5 oz) + Roundup PowerMAX (22 fl oz) + AMS (17 lb)	Prowl + Status + RupPM	
	Resolve Q (1.25 oz) + Atrazine (0.75 qt) + Roundup PowerMAX (22 fl oz) + AMS (17 lb)	Resolve Q + Atrazine + RupPM	
	Roundup PowerMAX (22 fl oz) + Status (2.5 oz) + Guardzman Max (2.5 pt) + AMS (17 lb)	RupPM + Status + GMax	
POST (2-pass)	Roundup PowerMax (22 fl oz) + AMS (17 lb) – EP fb. MP	RupPM (EP) fb. RupPM (MP)	
	Roundup PowerMax (22 fl oz) + AMS (17 lb) – MP fb. LP	RupPM (MP) fb. RupPM (LP)	

Table 3. Corn injury, weed control, program costs, corn yield, and economic returns for 31 herbicide programs in 2009.

Programs	Herbicide Treatments	Corn inj	SETFA	CHEAL	AMAPO	ABUTH	All Weeds	Costs ¹	Yield	Econ. Returns ²
		(%)	----- % control-----				(≥90%)	(\$/A)	(bu/A)	(\$/A)
Conventional										
PRE	BreakFree ATZ	0	70	71	94	76	NO	\$25.93	230*	\$733.07*
	Keystone + Hornet	0	73	93	98	98	NO	\$47.93	230*	\$712.17*
	Lumax + Atrazine	0	75	95	97	98	NO	\$49.90	229*	\$706.91*
	SureStart + Keystone	0	77	89	97	99	NO	\$44.76	231*	\$716.99*
PRE/MPOS	Bicep Lt fb Impact + Atrazine	0	79	88	94	83	NO	\$45.58	234*	\$726.07*
	GMax fb Status	0	86	79	94	85	NO	\$55.32	213	\$646.48
	Harness Xtra fb Yukon	0	76	95	100	98	NO	\$38.94	226*	\$706.86*
MPOS	Capreno + Atrazine	0	79	96	99	99	NO	\$29.46	236*	\$748.24*
	Laudis + Atrazine	0	68	97	100	100	NO	\$29.09	228*	\$722.21*
	Steadfast Q + Atrazine + Status	0	80	96	100	95	NO	\$21.76	231*	\$738.89*
Liberty Link										
PRE/LPOS	Atrazine fb Ignite	0	76	73	88	88	NO	\$32.57	227*	\$717.08*
POST (2-pass)	Ignite fb Ignite	0	63	72	92	90	NO	\$36.11	233*	\$731.14*
Roundup Ready										
PRE/MPOS	Bicep fb Halex	0	96	99	100	100	YES	\$63.65	235*	\$711.85*
	Bicep Lt fb Impact + RupPM	0	77	80	94	85	NO	\$58.77	231*	\$704.63*
	Degree Xtra fb RupPM	0	84	76	95	91	NO	\$54.82	229*	\$701.71*
	GMax fb Status + RupPM	0	75	70	93	84	NO	\$58.48	232*	\$705.47*
	Harness Xtra fb RupPM	0	74	70	91	83	NO	\$52.84	233*	\$716.61*
	Harness Xtra fb Yukon + RupPM	0	76	95	99	94	NO	\$48.30	230*	\$710.15*
	Lumax fb Tdown	0	86	92	100	98	NO	\$65.70	236*	\$713.65*
	Parallel fb RupPM	0	82	68	83	79	NO	\$43.44	227*	\$706.21*
	Parallel fb RupPM	0	88	71	91	86	NO	\$46.00	236*	\$733.35*
	Parallel Plus fb RupPM	0	78	69	83	85	NO	\$46.47	231*	\$714.73*
	Parallel Plus fb RupPM	0	82	74	93	89	NO	\$52.19	228*	\$698.56*
	Resolve fb RupPM	0	78	81	96	93	NO	\$46.42	238*	\$738.98*
	SureStart fb Durango	0	76	91	97	99	NO	\$52.86	222	\$680.29
PRE/LPOS	Harness Xtra fb Yukon + RupPM	0	76	92	99	100	NO	\$48.30	217	\$668.46
EPOS	Harness Xtra + RupPM	0	90	93	99	92	YES	\$45.84	232*	\$720.31*
	SureStart + Durango	0	76	93	98	91	NO	\$48.45	231*	\$714.40*
MPOS	Halex + Atrazine	0	96	99	100	100	YES	\$43.77	232*	\$721.28*
	Prowl + Status + RupPM	0	67	93	90	93	NO	\$45.04	232*	\$721.11*
	Resolve Q + Atrazine + RupPM	0	80	94	100	95	NO	\$41.63	235*	\$734.97*
	RupPM + Status + GMax	0	97	97	100	91	YES	\$51.48	231*	\$711.37*
POST (2-pass)	RupPM (EP) fb. RupPM (MP)	0	72	73	71	87	NO	\$49.25	230*	\$708.65*
	Non-treated	0	0	0	0	0	NO	0	148	\$487.85

Abbreviations: SETFA = giant foxtail, CHEAL = common lambsquarters, AMAPO = pigweed, ABUTH = velvetleaf, fb. = followed by.

¹Herbicide and additive costs = avg. of price lists (April 2009); Application cost = \$7.00/A; Roundup Ready seed premium = \$8.25/A; seeding rate = 30,000 seeds/A. Weed control costs = Herbicide \$ + Additive \$ + Application \$ + seed premium \$ (where applicable).

²Crop selling price = \$3.30/bu (December 2009). Economic return = (Yield x Price) – Weed Control Costs.

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