MSU Weed Science

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Economics of Commercial Weed Control Programs in No-Till Soybean, 2007

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A field trial in no-till 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. Within 2 days after planting the site received 1.19 inches of rainfall. Yield loss due to weeds was extremely high. The maximum soybean yield was 72.3 bu/A and the weedy (untreated) yield was 11.6 bu/A, resulting in a yield loss of 60.7 bu/A (84%). Table 3 contains the data for weed control, herbicide program costs, soybean yield, and economic returns.

Table1. Site description.

Crop	Soybean
Variety	Asgrow 2107
Soil Texture	Clay loam
Soil pH	6.4
Soil Organic Matter	3.1
Dominant Weeds	white campion, dandelion, common chickweed, annual grasses (foxtail and crabgrass), common ragweed and common lambsquarters
Planting Date	May 14
Application Timings:	
14 d EPP	April 30
7 d EPP	May 7
PRE	May 14
Mid-POST (MPOS)	June 13
POST	June 18
Late-POST (LPOS)	July 2
Evaluation Time	90 d (weed control)

Table 2. Commercial no-till soybean herbicide programs selected by companies.

Conventional	***Treatments (Rate/A)***	***Abbreviated Form***
PRE	Sencor (6.4 oz) + Linex (1.25 pt) + Define (1 pt) + Roundup WeatherMax (22 fl oz) + AMS (17 lb/100 gal)	Sencor + Linex + Define + RupWM
	Define (15 fl oz) + Extreme (3 pt) + Sencor (6.4 oz) + NIS (0.25%) + AMS (17 lb/100 gal)	Define + Extreme + Sencor
Roundup Ready		
14EPP/MPOS	Envive (2.5 oz) + 2,4-D ester (1 pt) + COC (1%) fb. Roundup OriginalMax (22 fl oz) + AMS (2.5 lb)	Envive + 2,4-D fb. RupOM
14EPP/POST	Canopy (2.25 oz) + 2,4-D ester (1 pt) + COC (1%) fb. Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal)	Canopy + 2,4-D fb. RupOM
14EPP/MP/LP	Roundup OriginalMax (22 fl oz) + 2,4-D ester (1 pt) + AMS (17 lb/100 gal) fb. Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal) fb. Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal)	RupOM + 2,4-D fb. ROM fb. ROM
7EPP/MPOS	Sencor (8 oz) + 2,4-D ester (1 pt) + COC (1 qt) fb. Roundup WeatherMax (22 fl oz) + AMS (17 lb/100 gal)	Sencor + 2,4-D fb. RupWM
7EPP/POST	Boundary (1.5 pt) + Gramoxone (2 pt) + 2,4-D ester (1 pt) + COC (1%) fb. Touchdown Total (24 fl oz) + AMS (17 lb/100 gal)	Boundary + Gram + 2,4-D fb. Tdown
	Python (0.8 oz) + Durango (24 fl oz) + 2,4-D ester (1 pt) + AMS (1.5%) fb. Durango (24 fl oz) + AMS (1.5%)	Python + Dur + 2,4-D fb. Dur
	Sequence (3.5 pt) + 2,4-D ester (1 pt) + AMS (17 lb/100 gal) fb. Touchdown Total + AMS (17 lb/100 gal)	Sequence + 2,4-D fb. Tdown
	Sencor (8 oz) + Extreme (3 pt) + Activator 90 (0.25%) + AMS (17 lb/100 gal) fb. Roundup WeatherMax (22 fl oz) + AMS (17 lb/100 gal)	Sencor + Extreme fb. RupWM
	Valor (2 oz) + Roundup OriginalMax (22 fl oz) + 2,4-D ester (1 pt) + AMS (17 lb/100 gal) fb. Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal)	Valor + RupOM + 2,4-D fb. RupOM
	Extreme (3 pt) + 2,4-D ester (1 pt) + Activator 90 (0.125%) + AMS (8.5 lb/100 gal) fb. Buccaneer Plus (32 fl oz) + AMS (8.5 lb/100 gal)	Extreme + 2,4-D fb. Buccaneer
	Prowl H_2O (2.5 pt) + Buccaneer (29 fl oz) + 2,4-D ester (1 pt) + Activator 90 (0.25%) + AMS (8.5 lb/100 gal) fb. Buccaneer Plus (32 fl oz) + AMS (8.5 lb/100 gal)	Prowl + Bucnr + 2,4-D fb. Bucnr
	Buccaneer Plus (24 fl oz) + 2,4-D ester (1 pt) + AMS (8.5 lb/100 gal) fb. Buccaneer Plus (32 fl oz) + AMS (8.5 lb/100 gal)	Bucnr + 2,4-D fb. Bucnr
	Sonic (3 oz) + Durango DMA (24 fl oz) + 2,4-D ester (1 pt) + AMS (1.5%) fb. Durango DMA (24 fl oz) + AMS (1.5%)	Sonic + DuraD + 2,4-D fb. DuraD
PRE/POST	Valor XLT (3 oz) + Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal) fb. Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal)	Valor XLT + RupOM fb. RupOM
	IntRRo (1.5 qt) + Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal) fb. Roundup OriginalMax (22 fl oz) + AMS (17 lb/100 gal)	IntRRo + RupOM fb. RupOM
PRE/MP/LP	Valor (2 oz) + Roundup OMax (22 fl oz) + AMS (17 lb/100 gal) fb. Roundup OMax (22 fl oz) + AMS (17 lb/100 gal) fb. Roundup OMax (22 fl oz) + AMS (17 lb/100 gal)	Valor + RupOM fb. ROM fb. ROM
	Roundup OMax (22 fl oz) + AMS (17 lb/100 gal) fb. Roundup WMax (22 fl oz) + AMS (17 lb/100 gal) fb. Roundup WMax (22 fl oz) + AMS (17 lb/100 gal)	RupOM fb. RWM fb. RWM

Table 3. Soybean injury, weed control, program costs, soybean yield, and economic returns for 19 no-till herbicide programs in 2007.

Herbicide Programs	No-till weeds	ANGR	AMBEL	CHEAL	All Weeds	Costs[1]	Yield	Economic Returns[2]
	% control				(≥90%)	($/A)	(bu/A)	($/A)
PRE *(Conventional)*								
Sencor + Linex + Define + RupWM	40	**92**	**90**	**96**	NO	44.49	51	506.47
Define + Extreme + Sencor	35	**99**	**96**	**99**	NO	39.33	37	361.07
14 EPP/MPOS *(Roundup Ready)*								
Envive + 2,4-D fb. RupOM	**99**	**99**	**99**	**99**	**YES**	46.63	**67***	**685.16***
14 EPP/POST *(Roundup Ready)*								
Canopy + 2,4-D fb. RupOM	89	**99**	**99**	**99**	NO	44.07	57	582.71
14EPP/MP/LP *(Roundup Ready)*								
RupOM + 2,4-D fb. ROM fb. ROM	**99**	**99**	**99**	**99**	**YES**	55.60	**66***	**659.55***
7EPP/MPOS (Roundup Ready)								
Sencor + 2,4-D fb. RupWM	**97**	**96**	**99**	**99**	**YES**	46.75	**72***	**736.32***
7EPP/POST (Roundup Ready)								
Boundary + Gram + 2,4-D fb. Tdown	88	**98**	**99**	**97**	NO	58.56	**65***	**653.86***
Python + Dur + 2,4-D fb. Dur	**99**	**99**	**99**	**99**	**YES**	47.66	**72***	**740.86***
Sequence + 2,4-D fb. Tdown	**99**	**99**	**99**	**99**	**YES**	60.24	**71***	**714.37***
Sencor + Extreme fb. RupWM	**99**	**99**	**99**	**99**	**YES**	56.29	**69***	**693.50***
Valor + RupOM + 2,4-D fb. RupOM	**95**	**97**	**99**	**99**	**YES**	51.64	**60***	605.69
Extreme + 2,4-D fb. Buccaneer	**96**	**99**	**99**	**99**	**YES**	46.22	58	586.29
Prowl + Bucnr + 2,4-D fb. Bucnr	**92**	**99**	**99**	**99**	**YES**	48.37	**68***	**697.33***
Bucnr + 2,4-D fb. Bucnr	**92**	**99**	**98**	**96**	**YES**	38.44	**60***	**616.89***
Sonic + DuraD + 2,4-D fb. DuraD	**95**	**96**	**99**	**99**	**YES**	50.45	**68***	**686.20***
PRE/POST (Roundup Ready)								
Valor XLT + RupOM fb. RupOM	**92**	**97**	**99**	**99**	**YES**	50.21	**65***	**655.39***
IntRRo + RupOM fb. RupOM	61	**99**	**99**	**99**	NO	49.01	53	530.86
PRE/MP/LP (Roundup Ready)								
Valor + RupOM fb. ROM fb. ROM	**93**	**99**	**99**	**99**	**YES**	62.37	**63***	**623.60***
RupOM fb. RWM fb. RWM	**98**	**99**	**99**	**99**	**YES**	56.95	**60***	600.10
Untreated	0	0	0	0	NO	0	12	126.83

Abbreviations: ANGR = giant foxtail & l. crabgrass, AMBEL = common ragweed, CHEAL = common lambsquarters, fb. = followed by.

[1]Herbicide and additive costs = avg. of price lists (April 2007); Application cost = $6.00/A; Roundup Ready seed premium = $15.82/A; seeding rate = 205,000 seeds/A. Weed control costs = Herbicide $ + Additive $ + Application $ + seed premium $ (where applicable).

[2]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.