Project Number: 13K 3419 6228

Title: Weed control in cucumbers.

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Accomplishments: One cucumber study was conducted in 2005, the herbicide by timing trial. Six herbicides in various combinations were tested for crop safety in cucumbers; a total of fifteen treatments were applied.

Results: Results will be presented at the Western Washington Horticultural Association meeting in January, 2006.

Three plantings of pickling cucumber (cv. 'Calypso') were seeded at WSU NWREC approximately one month apart (May 12, June 14, and July 7). Herbicides were applied preemergence (PRE) and postemergence (POST) at similar timings for each planting. Dates for the early planting were May 12 and June 21 for PRE and POST, respectively; the middle planting was treated June 14 and July 12, and the late planting was treated July 12 and August 5. Command at 10.7 fl.oz/a was applied PRE to two of the four rows in each plot to determine the impact of additional herbicide to the broadcast treatments. Early crop injury and weed control were rated June 7, August 9 and August 9 for the three plantings, and weed control at harvest was rated August 9 and 23 and September 19. Cucumber plants from 1-m sections of all rows were counted August 9 and 23 and September 19, and total vine and fruit fresh weight was recorded. Fresh weight of weeds growing in those row sections was also tallied. The experimental design was a split-block, randomized complete block with four replicates.

When averaged across all herbicide treatments, the additional Command slightly increased early crop injury (1%), but resulted in 20% higher weed control by harvest (Table 1). This enhanced weed control improved cucumber growth (vines plus fruit) 1.1 kg/plot and resulted in an 8-fold decrease in weed weight. Cucumber planting date significantly affected all measured parameters. Early crop injury from herbicide application was moderate in the early planting, but only slight in middle and late plantings (Table 1). Weed control averaged only 63% at harvest in the early planting, contrasted with 96 and 97% in the middle and late plantings, respectively. Crop density was lowest and weed weight was highest in the early planting, while crop weight was maximized in the middle planting.

The interaction of herbicide effects, planting date, and additional command on crop injury, weed control, and crop productivity are provided in Tables 2 through 4. Early crop injury approached or exceeded 20% in the early planting with Outlook or Dual Magnum, regardless of additional Command (Table 2), but these products did not display a similar level of injury in middle or late plantings. This response could have resulted from slower cucumber growth from cooler, wetter soils in May compared to June or July. Injury to Basagran was moderate, particularly in later plantings, presumably due to higher temperatures at the time of treatment. Additional Command dramatically improved weed control in the early planting, but only slightly in middle and late plantings (Table 3), indicating either that Command was more effective earlier or that weeds were far less a problem in later plantings. Weight of cucumber vines and fruit was improved by additional Command in early and late plantings (Table 4). This is illustrated by setting an arbitrary level of 5 kg harvested per plot. Twelve treatments with additional Command in the early planting and 15 in the late planting exceeded 5 kg, while only 5 in the early planting and 7 in the late planting did when Command was not used.

Table 1. Effect of Command application or planting date on crop injury, weed control, crop density, and yield parameters.

Treatment	Crop injury[a]	Weed control[b]	Crop density[b]	Crop weight[b]	Weed weight[b]
	%	%	plants/plot	kg	g
Command	7 a	95 a	22.4	7.3 a	80 b
No command	6 b	75 b	21.9	6.2 b	641 a
$LSD_{0.05}$	1	3	ns	0.3	94
Early planting	12 a	63 b	18.8 b	6.1 c	930 a
Middle planting	3 c	96 a	23.4 a	7.7 a	114 b
Late planting	5 b	97 a	24.4 a	6.5 b	37 b
$LSD_{0.05}$	1	4	1.3	0.4	115

[a]Crop injury estimated about 4 weeks after planting.
[b]Weed control, crop density, crop weight, and weed weight determined at harvest (August 9, August 23, and September 19).

Table 2. Crop injury after treatment with several herbicide combinations at three different timings (2005).

Treatment	Rate	Timing	Crop injury by planting date with and without Command[a]					
			Early planting		Mid planting		Late planting	
			Com +	Com -	Com +	Com -	Com +	Com -
	product/a		%	%	%	%	%	%
Sandea	0.5 oz	PRE	8	7	0	0	2	0
Curbit	2 pt	PRE	7	3	1	0	0	0
Dual Magnum	13.4 fl.oz	PRE	22	17	3	3	0	0
Outlook	12.8 fl.oz	PRE	25	23	5	5	3	3
Command + Curbit	5.3 fl.oz + 2 pt	PRE + PRE	8	7	0	0	0	0
Curbit + Sandea	2 pt + 0.5 oz	PRE + PRE	7	5	2	0	2	0
Dual Magnum + Sandea	+ 0.5 oz	PRE + PRE	23	20	3	2	5	3
Outlook + Sandea	+ 0.5 oz	PRE + PRE	22	22	10	8	0	0
Command + Curbit + Sandea	5.3 fl.oz + 2 pt + 0.5 oz	PRE + PRE + PRE	8	5	2	2	0	0
Basagran	8 fl.oz	POST	5	0	0	0	12	10
Sandea fb Basagran	0.5 oz fb 8 fl.oz	PRE fb POST	7	2	2	2	13	12
Curbit fb Basagran	2 pt + 8 fl.oz	PRE fb POST	8	2	0	0	15	10
Dual Magnum fb Basagran	13.4 fl.oz fb 8 fl.oz	PRE fb POST	22	18	10	8	10	8
Outlook fb Basagran	12.8 fb 8 fl.oz	PRE fb POST	23	20	12	8	15	15
Command + Curbit fb Basagran	5.3 fl.oz + 2 pt fb 8 fl.oz	PRE + PRE fb POST	12	8	2	2	13	12
Hand weeded	---	---	5	0	0	0	0	0

[a]First planting May 12, second planting June 14, and third planting July 7; PRE = preemergence, applied May 12, June 14, and July 12; POST = postemergence, applied June 21, July 12, and August 5. Crop injury evaluated June 7, August 9, and August 9. Com + = rows sprayed with additional Command herbicide (10.7 fl.oz/a, PRE); Com - = rows not sprayed with additional Command.

Table 3. Weed control at harvest after treatment with several herbicide combinations at three different timings (2005).

Treatment	Rate	Timing	Weed control by planting date with and without Command[a]					
			Early planting		Mid planting		Late planting	
			Com +	Com -	Com +	Com -	Com +	Com -
	product/a		%	%	%	%	%	%
Sandea	0.5 oz	PRE	90	50	98	87	97	100
Curbit	2 pt	PRE	95	60	98	88	100	98
Dual Magnum	13.4 fl.oz	PRE	90	0	100	77	100	100
Outlook	12.8 fl.oz	PRE	83	40	100	87	98	90
Command + Curbit	5.3 fl.oz + 2 pt	PRE + PRE	85	27	98	88	100	87
Curbit + Sandea	2 pt + 0.5 oz	PRE + PRE	75	30	100	95	100	100
Dual Magnum + Sandea	+ 0.5 oz	PRE + PRE	90	48	100	98	100	87
Outlook + Sandea	+ 0.5 oz	PRE + PRE	88	47	100	98	100	98
Command + Curbit + Sandea	5.3 fl.oz + 2 pt + 0.5 oz	PRE + PRE + PRE	83	53	98	100	98	95
Basagran	8 fl.oz	POST	82	18	98	85	100	92
Sandea fb Basagran	0.5 oz fb 8 fl.oz	PRE fb POST	93	33	98	98	100	98
Curbit fb Basagran	2 pt + 8 fl.oz	PRE fb POST	92	50	98	93	96	90
Dual Magnum fb Basagran	13.4 fl.oz fb 8 fl.oz	PRE fb POST	82	18	100	96	100	93
Outlook fb Basagran	12.8 fb 8 fl.oz	PRE fb POST	90	33	100	97	100	98
Command + Curbit fb Basagran	5.3 fl.oz + 2 pt fb 8 fl.oz	PRE + PRE fb POST	88	60	100	100	100	100
Hand weeded	---	---	91	0	98	96	100	100

[a]First planting May 12, second planting June 14, and third planting July 7; PRE = preemergence, applied May 12, June 14, and July 12; POST = postemergence, applied June 21, July 12, and August 5. Crop injury evaluated August 9, August 23, and September 19.

Table 4. Cucumber and fruit fresh weight after treatment with several herbicide combinations at three different timings (2005).

Treatment	Rate	Timing	Cucumber weight by planting date with and without Command[a]					
			Early planting		Mid planting		Late planting	
			Com +	Com -	Com +	Com -	Com +	Com -
	product/a		kg/plot	kg/plot	kg/plot	kg/plot	kg/plot	kg/plot
Sandea	0.5 oz	PRE	7.9	4.3	7.4	8.5	7.2	7.0
Curbit	2 pt	PRE	7.2	6.5	7.9	7.7	7.5	7.8
Dual Magnum	13.4 fl.oz	PRE	7.8	2.7	7.1	6.5	7.7	5.7
Outlook	12.8 fl.oz	PRE	5.8	4.5	7.2	6.4	7.1	5.5
Command + Curbit	5.3 fl.oz + 2 pt	PRE + PRE	8.4	6.9	9.8	8.3	6.7	6.0
Curbit + Sandea	2 pt + 0.5 oz	PRE + PRE	6.8	3.0	8.2	7.4	7.3	7.3
Dual Magnum + Sandea	+ 0.5 oz	PRE + PRE	5.8	5.1	7.8	7.4	7.5	5.5
Outlook + Sandea	+ 0.5 oz	PRE + PRE	5.9	5.6	7.4	6.7	6.9	5.4
Command + Curbit + Sandea	5.3 fl.oz + 2 pt + 0.5 oz	PRE + PRE + PRE	7.1	8.1	9.8	8.5	7.3	6.8
Basagran	8 fl.oz	POST	7.2	3.8	8.9	8.0	6.7	6.0
Sandea fb Basagran	0.5 oz fb 8 fl.oz	PRE fb POST	7.3	4.7	8.0	7.7	6.5	5.6
Curbit fb Basagran	2 pt + 8 fl.oz	PRE fb POST	7.4	4.2	9.3	9.2	6.3	5.8
Dual Magnum fb Basagran	13.4 fl.oz fb 8 fl.oz	PRE fb POST	6.1	2.6	6.5	6.7	7.2	5.5
Outlook fb Basagran	12.8 fb 8 fl.oz	PRE fb POST	5.3	4.7	6.8	6.1	5.5	4.6
Command + Curbit fb Basagran	5.3 fl.oz + 2 pt fb 8 fl.oz	PRE + PRE fb POST	6.7	8.6	8.9	7.4	7.1	6.2
Hand weeded	---	---	6.9	9.1	8.0	5.9	7.4	5.5

[a]First planting May 12, second planting June 14, and third planting July 7; PRE = preemergence, applied May 12, June 14, and July 12; POST = postemergence, applied June 21, July 12, and August 5. Crop injury evaluated June 7, August 9, and August 9.