Weed Control in Green Peas.

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Four field trials were conducted in green peas at WSU Mount Vernon in 1999. The first study compared currently registered herbicides used in combination. The second study tested non-registered herbicides to determine their effects on green peas. The third study was the second iteration (1999 peas) of a plant-back study to determine the potential for herbicides used in green peas persisting in the soil to injure rotational crops. The fourth study was the rotational crop year of the first iteration (1998 peas) of the plant-back study.

Materials and Methods.

'Charo' green pea was used in all trials. All studies were arranged in a randomized complete block with four replicates.

Herbicide study. Plots were seeded May 14. Preplant incorporated (PPI), preemergence (PRE), and postemergence (POST) treatments were applied May 14, May 20, and June 11, respectively. Pea plants were at the 4-leaf stage at the time of the POST application. Crop injury and general weed control was visually estimated June 7 and 15. A 1-m^2 quadrat was placed within each plot August 4, and pea plants in the quadrat were counted, and yield components determined from those samples.

New herbicide trial. Plots were seeded May 14. PRE and POST treatments were applied May 21 and June 10, respectively. Pea plants were at the 4-leaf stage at the time of the POST application. Crop injury and general weed control was visually estimated June 7 and 15. A 1-m^2 quadrat were placed within each plot August 2, and pea plants in the quadrat were counted, and yield components determined from those samples.

Plant-back study (1999 peas). Plots were seeded May 13. Preplant incorporated (PPI), preemergence (PRE), and postemergence (POST) treatments were applied May 13, May 19, and June 10, respectively. Pea plants were at the 4-leaf stage at the time of the POST application. Crop injury and general weed control was visually estimated June 7. A 1-m^2 quadrat was placed within each plot July 28, and pea plants in the quadrat were counted, and yield components determined from those samples.

Plant-back study (1998 peas). Crops planted in fall of 1998 were cabbage (September 10), winter wheat (October 1), and tulip (October 6). Crops planted in the spring of 1999 were spinach, strawberry, potatoes, sweet corn, and cucumbers. Weed control in the rotational crops was as typical for commercial production for that crop. These rotational crops were monitored for injury from carryover of the herbicides used in green peas during 1998. Injury assessment was based on crop density, height, biomass, and/or yield.

Results.

Herbicide study. Crop injury from these herbicides was generally low (Table 1). The only exceptions were the Basagran + MCPA tank mixtures, which caused 20 and 24% injury from 0.5 and 1 pt MCPA/A rates, respectively. This was primarily due to daily high temperatures of 84, 77, and 78 F in the three days after application. Other Basagran tank mixtures did not excessively injury peas. These treatments did not result in significant loss of crop density or yield (Table 2). Weed control from most treatments was excellent (> 90%), except for Basagran + 32-0-0, Basagran + MCPA, or Basagran + MCPB, which ranged from 78 to 83% control (Table 1).

New herbicide trial. Several treatments showed promise for potential registration in green peas. Axiom (premix of BAY FOE 5043 + metribuzin), First Rate, Broadstrike, Frontier, and Galaxy (premix of Basagran + Blazer) were selective in peas and gave excellent weed control (Table 3). Axiom applied postemergence did not adequately control weeds (56%), but did not reduce crop density or yield components (Table 4). First Rate and Broadstrike rates may have been too high, as pod number was reduced by these treatments. Raptor combined with nonionic surfactant injured peas; Raptor + 32-0-0 did not cause crop injury, but it only gave 55% weed control. Classic and Topnotch severely injured peas and will be dropped from future screening.

Plant-back study (1999 peas). Raptor plus nonionic surfactant injured peas, delaying flowering and resulting in fewer pods and lowered yield at the time of harvest, but did not reduce crop density (Table 5). Prowl + Raptor and Command gave 96 and 99% weed control, respectively, and very low crop injury.

Plant-back study (1998 peas). Strawberry was the only rotational crop in 1999 that exhibited significant injury from pea herbicides applied in the 1998 pea crop (data not shown). In particular, strawberry leaf area was significantly reduced by Raptor at the 1/3 pt/A rate. Spinach and sweet corn data are pending.

Table 1. Crop injury and weed control in green peas treated with several herbicides and herbicide combinations.

Treatment[a]	Timing[b]	Rate	Crop injury 6/7[c]	Crop injury 6/15	Weed control 6/7[c]	Weed control 6/15
		product/A	----- % -----		----- % -----	
Command + Sencor	PPI + PRE	0.33 pt + 4.3 oz	3	1	100	100
Treflan + Sencor	PPI + PRE	1 pt + 4.3 oz	8	8	100	100
Prowl + Sencor	PRE	1.2 pt + 4.3 oz	1	0	100	100
Dual Magnum + Sencor	PRE	0.75 pt + 4.3 oz	3	0	100	100
Basagran + 32-0-0	POST	0.5 pt + 0.5 gal	–	0	—	79
Basagran + MCPA	POST	1 pt + 0.5 pt	–	20	—	78
Basagran + MCPB	POST	1 pt + 2 pt	–	5	—	83
Basagran + MCPA	POST	0.5 pt + 1 pt	–	24	—	74
Basagran + MCPB	POST	0.5 pt + 3 pt	–	6	—	81
Basagran + Sencor	POST	0.5 pt + 2.7 oz	–	4	—	92
Basagran + Sencor	POST	0.25 pt + 5.3 oz	–	6	—	91
Command + Basagran	PPI + POST	0.33 pt + 1 pt	0	3	58	95
Treflan + Basagran	PPI + POST	1 pt + 1 pt	3	10	66	99
Prowl + Basagran	PRE + POST	1.2 pt + 1 pt	0	3	89	100
Dual Magnum + Basagran	PRE + POST	0.75 pt + 1 pt	0	6	95	97
Untreated check	—	—	0	0	0	0
$LSD_{0.05}$	—	—	3	6	17	5

[a]32-0-0 = liquid fertilizer (URAN).

[b]PPI = preplant incorporated; PRE = preemergence; POST = postemergence.

[c]On this date, postemergence treatments had not yet been applied.

Table 2. Green pea yield parameters after treatment with several herbicides and herbicide combinations.

Treatment[a]	Timing[b]	Rate	Plant pop.[c]	Plant plant	Pods/ Yield	
		product/A				tons/A
Command + Sencor	PPI + PRE	0.33 pt + 4.3 oz		2.80	5.0	2.7
Treflan + Sencor	PPI + PRE	1 pt + 4.3 oz		3.13	6.2	4.1
Prowl + Sencor	PRE	1.2 pt + 4.3 oz		3.18	5.4	3.1
Dual Magnum + Sencor	PRE	0.75 pt + 4.3 oz		2.96	5.7	3.3
Basagran + 32-0-0	POST	0.5 pt + 0.5 gal		2.86	5.6	3.5
Basagran + MCPA	POST	1 pt + 0.5 pt		2.97	5.2	2.8
Basagran + MCPB	POST	1 pt + 2 pt		2.94	6.0	3.8
Basagran + MCPA	POST	0.5 pt + 1 pt		3.17	5.6	3.6
Basagran + MCPB	POST	0.5 pt + 3 pt		3.34	5.3	3.5
Basagran + Sencor	POST	0.5 pt + 2.7 oz		3.11	5.4	3.1
Basagran + Sencor	POST	0.25 pt + 5.3 oz		3.38	5.4	3.5
Command + Basagran	PPI + POST	0.33 pt + 1 pt		2.87	5.9	3.2
Treflan + Basagran	PPI + POST	1 pt + 1 pt		3.01	5.6	3.9
Prowl + Basagran	PRE + POST	1.2 pt + 1 pt		3.32	5.5	3.6
Dual Magnum + Basagran	PRE + POST	0.75 pt + 1 pt		3.42	5.6	4.0
Untreated check	—	—		2.95	6.0	3.5
$LSD_{0.05}$	—	—		ns	ns	ns

[a]32-0-0 = liquid fertilizer (URAN).

[b]PPI = preplant incorporated; PRE = preemergence; POST = postemergence.

[c]Pea plants per acre (x 100,000).

Table 3. Crop injury and weed control in green peas treated with several herbicides and herbicide combinations.

Treatment[a]	Timing[b]	Rate	Crop injury 6/7[c]	Crop injury 6/15	Weed control 6/7[c]	Weed control 6/15
		product/A	----- % -----		----- % ------	
Axiom	PRE	1.1 lb	3	3	100	100
First Rate	PRE	0.6 oz	0	5	91	97
Broadstrike	PRE	1.1 oz	1	4	99	96
Frontier	PRE	1.33 pt	0	0	93	66
Topnotch	PRE	5 pt	41	46	100	100
Axiom	POST	0.75 lb	–	4	—	56
Classic + nis	POST	0.5 oz	–	44	—	68
Classic + nis	POST	0.75 oz	–	48	—	69
Galaxy	POST	1.3 pt	–	6	—	98
Prowl	PRE	2.4 pt	–	0	—	98
Raptor + 32-0-0 + nis	POST	0.25 pt + 1% + 0.25%	–	29	—	59
Raptor + Basagran	POST	0.25 pt + 0.75 pt	–	21	—	85
+ 32-0-0 + nis	POST	+ 1% + 0.25%				
Raptor + 32-0-0	POST	0.25 pt + 1%	–	0	—	55
Untreated check	—	—	0	0	0	0
$LSD_{0.05}$	—	—	5	5	5	17

[a]32-0-0 = liquid fertilizer (URAN); nis = nonionic surfactant (X-77).

[b]PRE = preemergence; POST = postemergence.

[c]On this date, postemergence treatments had not yet been applied.

Table 4. Green pea yield parameters after treatment with several herbicides and herbicide combinations.

Treatment[a]	Timing[b]	Rate	Plant pop.[c]	Pods/ plant	Yield
		product/A		tons/A	
Axiom	PRE	1.1 lb	3.36	5.8	3.6
First Rate	PRE	0.6 oz	2.90	4.6	2.6
Broadstrike	PRE	1.1 oz	3.11	4.9	2.7
Frontier	PRE	1.33 pt	2.98	5.8	2.7
Topnotch	PRE	5 pt	3.42	4.5	2.7
Axiom	POST	0.75 lb	3.25	5.9	3.2
Galaxy	POST	1.3 pt	3.13	5.6	2.5
Prowl	PRE	2.4 pt	2.97	6.4	3.0
Raptor + 32-0-0 + nis	POST	0.25 pt + 1% + 0.25%	3.09	5.3	1.8
Raptor + Basagran	POST	0.25 pt + 0.75 pt	3.26	5.7	2.7
+ 32-0-0 + nis	POST	+ 1% + 0.25%			
Raptor + 32-0-0	POST	0.25 pt + 1%	2.86	6.2	2.6
Untreated check	—	—	3.25	5.7	2.7
$LSD_{0.05}$	—	—	ns	0.9	ns

[a]32-0-0 = liquid fertilizer (URAN); nis = nonionic surfactant (X-77); Peas treated with Classic herbicide were not harvested due to severe crop injury.

[b]PRE = preemergence; POST = postemergence.

[c]Pea plants per acre (x 100,000).

Table 5. Crop injury, weed control, and yield parameters of green peas treated with several herbicides and herbicide combinations.

Treatment[a]	Timing[b]	Rate	Crop injury	Weed control	Plant pop.[c]	Pods/ plant	Yield
		product/A	%	%			tons/A
Raptor	POST	0.25 pt	21	85	3.25	3.6	0.6
+ 32-0-0 + nis	POST	+ 1.5 qt + 0.25%					
Raptor	POST	0.33 pt	28	85	4.11	3.8	0.7
+ 32-0-0 + nis	POST	+ 1.5 qt + 0.25%					
Prowl	PRE	2.4 pt	0	81	3.65	4.9	2.2
Prowl + Raptor	PRE + POST	2.4 pt + 0.25 pt	0	96	3.27	5.1	1.9
Treflan	PPI	1.5 pt	0	40	3.59	4.2	1.6
Command	PPI	1 pt	1	99	3.75	5.1	2.5
Spartan	PRE	5.3 oz	1	81	3.36	5.0	1.6
Untreated check	—	—	0	0	3.64	3.9	1.5
$LSD_{0.05}$	—	—	3	14	ns	1.2	0.7

[a]32-0-0 = liquid fertilizer (URAN); nis = nonionic surfactant (X-77).

[b]PPI = preplant incorporated; PRE = preemergence; POST = postemergence.

[c]Pea plants per acre (x 100,000).

Table 6. Effect of herbicides used in peas the previous year on fall rotational crops.

		Rotational crop (1998-99)					
		Cabbage		Wheat	Tulip		
1998 pea treatment[a]	Rate	density	biomass	biomass	Flower number	Flower height	Avg. bulb weight
	product/A	no./plot	g/plot	g/plot	no./plot	cm	
Raptor	0.25 pt	13	236	228	40	41	8.4
Raptor	0.33 pt	14	236	211	36	39	9.2
Prowl	2.4 pt	17	243	277	38	35	8.8
Prowl + Raptor	2.4 pt + 0.25 pt	14	246	260	40	40	8.8
Treflan	1.5 pt	16	253	232	33	40	8.3
Command	1 pt	22	226	253	37	40	7.7
Spartan	5.3 oz	21	260	259	30	34	8.0
Reflex	1.5 pt	20	198	211	37	35	8.6
Untreated check	—	20	273	294	37	40	8.5
$LSD_{0.05}$	—	ns	ns	ns	ns	ns	ns

Table 7. Effect of herbicides used in peas the previous year on spring rotational crops.

1998 pea treatment[a]	Rate		Rotational crop (1999) Spinach biomass	Strawberry (four plants) leaves	runners	daughters	leaf area	Potato tubers	Cucumber dens	no	wt	Sweet corn biomas
	product/A		g/3 plts	number			cm^2	kg/3 plts				
Raptor	0.25 pt		455.0	12	5	5	4664	6.4	27	55	1.6	1049.0
Raptor	0.33 pt	1	203.8	13	6	5	4150	6.8	30	61	1.5	615.8
Prowl	2.4 pt		664.0	12	5	4	5362	6.0	24	55	1.5	571.3
Prowl + Raptor	2.4 pt + 0.25 pt		1110.0	12	5	5	6149	6.2	32	65	1.4	838.3
Treflan	1.5 pt		646.5	11	5	5	5121	6.0	28	60	1.3	508.0
Command	1 pt		1276.8	12	5	5	4549	6.6	33	70	1.4	728.3
Spartan	5.3 oz		929.5	13	6	4	6089	5.7	23	47	0.9	400.8
Reflex	1.5 pt		572.0	15	7	6	5667	7.3	29	68	1.5	504.5
Untreated check	—		673.5	11	5	4	5435	6.7	26	60	1.1	664.8
$LSD_{0.05}$	—		ns	2	1	ns	1280	ns	ns	ns	ns	252.7

Yield

[a]32-0-0 = liquid fertilizer (URAN); nis = nonionic surfactant (X-77).

[b]PPI = preplant incorporated; PRE = preemergence; POST = postemergence.

[c]Pea plants per acre (x 100,000).