Weed Control in Horticultural Crops

Pea herbicide management trial at Waseca, MN - 2003. Becker, Roger L., Vincent A. Fritz, James B. Hebel, Douglas W. Miller, and Bradley D. Kinkaid. The objective of this experiment was to evaluate weed control and pea injury with several soil applied and postemergence herbicides. This study was conducted on a Webster clay loam soil. A randomized complete block design with three reps was utilized. Plot size was 10 feet by 20 feet. 'Brule 297' peas were seeded at 550,000 plants/A on May 18, 2003. Herbicide application data are provided below. Weed control and injury data are provided in the tables below.

Application Data

Treatment	PPI	PRE	POST
Date	5/16/03	5/21/03	6/14/03
Air Temp (°F)	57	47	76
Sky	partly cloudy	hazy	clear
Wind (mph)	S 5-8	SE 8-10	NE 2-5
Rainfall before Application			
Week 1 (inch)	2.15	0.29	2.00
Rainfall after Application			
Week 1 (inch)	0.15	0.06	0.02
Week 2 (inch)	0.09	0.09	1.44

As the season progressed, moisture became more limiting at Waseca. Moisture stress was moderate on pea. Control of giant foxtail was generally poor with all preemergence (PRE) products except with 0.047 lb imazethapyr applied PRE which resulted in fair control of giant foxtail. Preplant incorporated (PPI) pendimethalin at 1.5 lb applied alone or prior to postemergence (POST) broadleaf programs, or at a reduced 0.63 lb rate plus 0.047 lb of imazethapyr resulted in good giant foxtail control. Clomazone (0.5 lb) in combination with 0.63 lb pendimethalin PPI, or applied alone PRE resulted in fair giant foxtail control. Tank mixing clomazone (0.5 lb) with sulfentrazone (0.25 lb) did not improve giant foxtail control over that of clomazone applied alone. POST applications of quizalofop, imazethapyr, or imazamox all provided excellent giant foxtail control.

Pendimethalin (1.5 lb) PPI provided fair control of common lambsquarters, and as a package mix with imazethapyr (0.047 lb) provided excellent control of common lambsquarters. Clomazone (0.5 lb) alone PRE, tank mixed with pendimethalin (0.63 lb) PPI, or tank mixed with sufentrazone (0.25 lb) PRE all resulted in poor to fair control of common lambsquarters. Flumioxazin PRE does not provide adequate lambsquarters control. Imazethapyr (0.047 lb) soil applied PRE provided fair control of common lambsquarters while POST application with surfactants provided good control. Imazamox also provided good lambsquarters control POST. As in previous studies, even though these imidazolinone products can be weak on common lambsquarters at rates higher than used on processing pea, common lambsquarters control was good in part due to the competitive nature of pea which can take advantage of the initial stunting of common lambsquarters that are not directly killed by imidazolinone herbicides. Sulfentrazone (0.19 lb) provided good control of common lambsquarters applied POST compared to fair control of common lambsquarters when applied PRE. The higher rate (0.25 lb) of sulfentrazone applied PRE provided control similar to the lower rate applied POST by the July 9 rating. Bentazon and MCPB provided excellent control of common lambsquarters. Bentazon provided excellent lambsquarters control whether applied with or without crop oil concentrate.

Cocklebur control was excellent with POST applications of the imidazolinone herbicides, imazamox or imazethapyr. Both bentazon and MCPB provided excellent control of common cocklebur. Control of cocklebur with bentazon was achieved with or without crop oil concentrate (only a nonsignificant trend for improved performance when applied with crop oil concentrate). Sulfentrazone (0.19 lb) applied POST improved cocklebur control over the same rate or higher 0.25 lb rate when applied PRE, though control still was only fair compared to bentazon, MCPB, or the imidazolinones POST. Clomazone, whether applied alone or in tank mix, preemerge or PPI, did not provide adequate control of common cocklebur. Addition of sulfentrazone tank mix to clomazone PRE did not improve common cocklebur control. Flumioxazin did not provide common cocklebur control at the 0.063 lb or 0.094 lb rate. As repeatedly shown in previous studies, the same rate of imazethaphyr applied PRE provided markedly

lower control of large seeded broadleaf species such as common cocklebur compared to applying the same rate POST with additives.

Flumioxazin resulted in significant early growth reduction of pea as shown in the June 24 ratings, but these growth reductions were no longer apparent by the July 9 ratings. Bentazon, however, resulted in dramatic growth reductions that persisted through the July 9 ratings. The omission of crop oil concentrate did not decrease this crop injury. In addition to growth reduction, a marked leaf necrosis was apparent with the application of bentazon with or without the use of crop oil concentrate additive. There was a slight growth reduction with imazamox still evident by the July 9 rating, and a nonsignificant trend for growth reduction with imazethapyr. It is of note that the growth reductions observed with bentazon are likely due to persistent herbicide injury because these treatments provided excellent weed control and as such are not confounded with competition with weeds.

Peas were harvested on July 21 and were already well past target maturity. As in past years, pea maturity was delayed with the use of imazamox compared to other herbicide treatments. Unlike past years, the same delay in maturity was not evident this year with the use of imazethapyr. The potential for delay in maturity and growth reduction with the use of imidazolinone herbicides, while posing additional management needs to schedule harvests, etc. did result in excellent pea yields as in past studies. When compared to other treatments with excellent control such that weed competition is not confounding pea yield, bentazon applied with or without crop oil concentrate delayed pea maturity, buy unlike the imazamox treatments, also reduced pea yield. Bentazon treatments resulted in a significant reduction in pea yield compared to other treatments that provided good weed control such as imazamox, imazethapyr, MCPB or the PPI package mixture of pendimethalin & imazethapyr.

The impact of the broadleaf weed competition present in the study area is readily apparent in the low yields associated with flumioxazin treatments and with the total lack of broadleaf control in the quizalofop postemergence treatment. An even more dramatic yield reduction occurred in the weedy checks with no removal of grasses or broadleaf weed competition. As in past studies, hand weeding caused more damage than good in pea trials. (Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul).

Table 1. Pea herbicide weed management trial at Waseca, MN - 2003. (Becker et al.)

Treatment[1]	Rate[1]	Weed control SETFA 6/24	SETFA 7/9	CHEAL 6/24	CHEAL 7/9	XANST 6/19	XANST 7/9
	(lb ai/A)	(%)					
Preplant Incorporated							
Pendimethalin	1.5	97	87	93	80	19	38
Pendimethalin + clomazone[2]	0.63 + 0.5	81	73	89	72	26	39
Pendimethalin & imazethapyr[3]	0.63 + 0.047	93	88	99	96	57	56
Preemergence							
Clomazone	0.5	64	70	72	65	44	35
Sulfentrazone	0.19	61	45	98	73	33	42
Sulfentrazone	0.25	54	60	91	85	37	50
Clomazone + sulfentrazone	0.50 + 0.25	68	74	77	69	33	40
Flumioxazin	0.063	54	45	66	41	23	33
Flumioxazin	0.094	50	50	86	27	23	28
Imazethapyr	0.047	82	82	74	75	50	46
Postemergence							
Imazamox + NIS[4] + 28%N[5]	0.032 + 0.25% + 1.25%	90	98	94	99	96	96
Imazethapyr + NIS + 28%N	0.047 + 0.25% + 1.25%	92	96	88	97	96	95
Quizalofop-P + COC[6]	0.083 + 1.0%	96	100	0	0	0	0
Preplant Incorporated and (Postemergence)							
Pendimethalin + (bentazon + COC)	1.5 + (1.0 + 1.25%)	98	88	99	98	99	91
Pendimethalin + (bentazon)	1.5 + (1.0)	97	86	99	98	99	83
Pendimethalin + (MCPB)	1.5 + (0.75)	96	90	99	99	98	91
Pendimethalin + (sulfentrazone)	1.5 + (0.19)	95	89	99	89	92	73
Weedy check		--	--	--	--	--	--
Quizalofop-P + COC + Handweeded	0.083 + 1.0%	100	100	100	100	100	100
LSD (0.05)		18	14	23	28	26	15

[1] Treatments and rates in parenthesis represent a separate application.
[2] Command 3ME
[3] Premix = Pursuit Plus 2.9E.
[4] NIS = Class Preference nonionic surfactant.
[5] 28%N = 28% UAN fertilizer solution.
[6] COC = Class Crop Oil Concentrate.

Table 2. Pea herbicide weed management trial at Waseca, MN - 2003. (Becker et al.)

		Pea Injury						
		Necrosis		Growth Reduction		Chlorosis	Pea Harvest (7/21)	
Treatment[1]	Rate[1]	6/16	6/24	6/24	7/9	7/9	Tend.[2]	Yield
	(lb ai/A)	---------- (%) ----------						(Cwt/A)
Preplant Incorporated								
Pendimethalin	1.5	0	0	0	2	0	173	41.1
Pendimethalin + clomazone[3]	0.63 + 0.5	0	0	2	2	0	177	37.3
Pendimethalin & imazethapy[4]	0.63 + 0.047	0	0	0	2	0	176	46.8
Preemergence								
Clomazone	0.5	0	0	3	0	0	181	31.4
Sulfentrazone	0.19	0	0	5	0	0	179	22.0
Sulfentrazone	0.25	0	0	8	0	0	180	23.5
Clomazone + sulfentrazone	0.50 + 0.25	0	0	3	2	0	175	30.5
Flumioxazin	0.063	0	0	11	0	0	177	24.1
Flumioxazin	0.094	0	0	10	0	0	175	19.8
Imazethapyr	0.047	0	0	2	0	0	179	38.5
Postemergence								
Imazamox + NIS[5] + 28%N[6]	0.032 + 0.25% + 1.25%	2	3	5	9	0	156	57.1
Imazethapyr + NIS + 28%N	0.047 + 0.25% + 1.25%	0	5	6	4	0	175	55.8
Quizalofop-P + COC[7]	0.083 + 1.0%	0	0	0	0	0	183	38.4
Preplant Incorporated and (Postemergence)								
Pendimethalin + (bentazon + COC)	1.5 + (1.0 + 1.25%)	1	37	25	23	4	146	35.6
Pendimethalin + (bentazon)	1.5 + (1.0)	6	41	26	22	6	140	31.7
Pendimethalin + (MCPB)	1.5 + (0.75)	1	0	0	0	0	183	45.8
Pendimethalin + (sulfentrazone)	1.5 + (0.19)	3	2	0	0	1	190	60.1
Weedy check		0	0	0	0	0	189	22.9
Quizalofop-P + COC + Handweeded	0.083 + 1.0%	10	18	0	12	4	200	52.1
LSD (0.05)		ns	10	8	8	3	16	9.4

[1] Treatments and rates in parenthesis represent a separate application.
[2] Tend. = tenderometer reading (relative scale of measure).
[3] Command 3ME
[4] Premix = Pursuit Plus 2.9E.
[5] NIS = Class Preference nonionic surfactant.
[6] 28%N = 28% UAN fertilizer solution.
[7] COC = Class Crop Oil Concentrate.