Weed Control Alternatives in Snap Bean Production

Dan Curtis, R. D. William, G. Crabtree,
Horticulture Department, Oregon State University
Dan McGrath, Marion County Extension

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Narrative:

Introduction

Recent shifts in the weed control program associated with snap bean production have resulted in use of herbicide combinations that achieve processor standards for weed contamination through additive control of problem weeds. Weed skips of particularly troublesome weeds such as hairy nightshade and redroot pigweed have occurred. In addition, preplant incorporated treatments of pendimethalin have seriously injured beans. Research during two seasons identified 2 diphenyl ether herbicides from the soybean market which looked promising in snap beans. Unfortunately, neither company wished to proceed with registration for snap beans.

To supplement current programs, research strategies in 1989 focused on possible use of 2 marginally acceptable diphenyl ether herbicides, acifluorfen and oxyfluorfen, along with postemergence treatments of Basagran under cool conditions, and Prowl applied preemergence.

Field trails were established at 5 sites in 1989; 4 with grower-cooperators and 1 at the OSU Vegetable Research Farm. Silt loams with 5-15% and clay contents and 2-10% OM were prevalent at 2 grower sites (trials 2 and 3), whereas silty clay loams with 27-40% clay contents and 10% OM were evident at sites 1 and 4. The OSU farm contains a silty clay loam with 30-40% clay content and 5-10% OM. Tables 1-5 display treatments, average crop injury ratings, weed control ratings and harvest yields. All treatments received Treflan preplant incorporated at trial 1, Eptam preplant incorporated to all treatments at trial 2, and a combination of both Treflan and Eptam preplant incorporated at trials 3 and 4.. Treatments at the OSU Vegetable Research Farm are as indicated.

Discussion

Preemergence Treatments:

Acifluorfen applied preemergence controlled pigweed (AMARE) and groundsel (SENVU) at the 2 sites with the greater clay contents, Tables 1 and 4. Unfortunately, unacceptable crop injury occurred along with relatively poor weed control at sites with less clay

content, Tables 2 and 3. Bean symptoms were noted that delayed growth and development, but failed to exhibit any physical distortions or chlorosis. Yields appeared normal although harvest would have been delayed by approximately 2 weeks.

Oxyfluorfen applied as a preemergence band between rows provided selective control of pigweed, groundsel and shepherds purse (CAPBU), Tables 1-3, except where the herbicide overlapped within the bean row in trial 4, Table 4. Precision banding requires that nozzles be attached to the planter.

Prowl applied preemergence improved crop selectivity compared to preplant incorporation at the OSU site, Table 5. Prowl controlled nightshade (SOLSA) and wild mustard (BRSNI) 80-100%. Groundsel, however, was not controlled although yields were similar in the presence of this weed. At this site the Eptam/ Treflan/ chloramben combination resulted in higher yields than the Eptam/ Treflan/ Dual combination, although stunting was evident early in the season and mustard pressure probably reduced yields in the latter treatment.

Postemergence Treatments:

Acifluorfen applied postemergence caused intial severe leaf injury to the crop in all trials except at site 1, Tables 1-4. Symptoms, however, were negligible after three weeks. Yields were similar with these treatments. Grounsel was controlled with a combination of Eptam preplant incorporated/ acifluorfen postemergence, Table 3, but was marginal with Treflan preplant incorporated/acifluorfen preemergence, Table 1. Pigweed control was excellent with these treatments, including removal of 8-inch pigweed with a postemergence spray of acifluorfen.

Basagran treatments were inconsistent in groundsel control, Table 1 and 3. Shepherds purse was controlled at trial 3 with all Basagran treatments. While addition of Dash (a BASF proprietary blend of surfactants) improved weed control slightly, UAN 32 failed to improve control, Tables 2, 3, and 4. Yields with Basagran were erratic in trial 1, while rate increases from 0.5 lbs. ai/acre to 1.0 lbs. ai/acre did not improve weed control.

Directed sprays of acifluorfen reduced visual injury considerably, tables 3 and 4. Yields were similar to acifluorfen used postemergence.

Directed sprays of oxyfluorfen, while not drastically reducing yields, dramatically damaged bean foliage. However, weed control was excellent, Tables 3 and 4.

Conclusions

Acifluorfen applied preemergence caused unacceptable stunting at the sites containing scant clay, probably due to its water solubility. We plan to continue work towards registration of a postemergence or directed spray of acifluorfen for snap beans.

Oxyfluorfen applied as a preemergence band will also be pursued, but nozzles must be mounted on the planter. Future plans also include continued testing of oxyfluorfen as a postemergence directed spray with an emphasis on spray timing of the sprays.

Basagran controlled mustard weeds, but pigweed escaped treatments at all rates. Dash seemed to improve performance of Basagran slightly. herbicide.

Label changes should be considered for Prowl to improve crop safety and weed control using preemegence treatments. Tank mixes with Dual could improve broad spectrum control with a single application.

Table 1 Crop Injury, Weed Control and Yield Averages From OFF-STATION TRIAL # 1 (PEORIA)

TRT. NO.	PESTICIDE NAME	RATE	TYPE	BEANS %INJURY 6/05/89	BEANS % INJRY 6/26/89	SENVU % CNTRL 6/26/89	BEANS % INJRY 7/10/89	SENVU % CNTRL 7/10/89	YIELD T/A 8/02/89
01	ACIFLUORFEN	A		0	0	0	1	5	5.84
02	ACIFLUORFEN	B	POST	1	1	0	3	13	5.69
03	ACIFLUORFEN	A	PRE	1	1	100	3	100	6.23
04	ACIFLUORFEN	B	PRE	1	3	100	4	100	6.64
05	OXYFLUORFEN AMIBEN	A 2.25	BNDBR BNDOR	0	0	99	0	99	5.99
06	OXYFLUORFEN AMIBEN	B 2.25	BNDBR BNDOR	4	5	99	20	100	5.60
07	BASAGRAN	0.50	POST	1	0	0	0	0	5.81
08	BASAGRAN COC	0.50	POST	0	0	0	0	0	4.22
09	BASAGRAN UAN32 COC	0.50	POST POST	0	4	0	3	5	4.76
10	BASAGRAN	1.00	POST	0	1	0	4	10	5.72
11	BASAGRAN COC	1.00	POST	0	1	0	4	10	3.56
12	BASAGRAN UAN32 COC	1.00	POST POST	1	3	0	0	5	6.40
13	CONTROL			0	0	0	0	0	5.75
		LSD(0.05) =		3	4	1	12	17	2.4

[z] COC = crop oil concentrate, a BASF proprietory mixture, was added to treatments where indicated at 1.00 quart per acre.

[y] Dash = BASF surfactant, added to treatments where noted at a rate of 1.00 quart per acre.

[x] PPI = Pre-plant incorporated application.

[w] PRE = Preemergence application.

[v] POST = Postemergence application.

[u] BNDBR = Banded between rows application.

[t] BNDOR = Banded over rows application.

Table 2 Crop Injury, Weed Control and Yield Averages From OFF-STATION TRIAL # 2 (GRAND ISLAND)

TRT. NO.	PESTICIDE NAME	RATE	TYPE	BEANS % INJRY 7/06/89	AMARE % CNTRL 7/06/89	BEANS % INJRY 7/26/89	AMARE % CNTRL 7/26/89	YIELD TONS/A 8/04/89
01	ACIFLUORFEN	A	POST	0	0	4	89	7.74
02	ACIFLUORFEN	B	POST	1	0	10	93	6.59
03	ACIFLUORFEN	C	PRE	30	93	28	88	4.22
04	ACIFLUORFEN	D	PRE	73	98	58	97	1.47
05	OXYFLUORFEN	A	BNDBR	1	92	0	91	6.63
	AMIBEN	2.25	BNDOR					
06	OXYFLUORFEN	B	BNDBR	5	93	3	96	6.92
	AMIBEN	2.25	BNDOR					
07	BASAGRAN	0.50	POST	0	25	0	50	6.36
08	BASAGRAN	0.50	POST	0	13	0	51	6.67
	COC	0.25	POST					
09	BASAGRAN	0.50	POST	0	20	4	70	6.24
	COC	0.25	POST					
	UAN32	1.00	POST					
10	BASAGRAN	1.00	POST	0	0	0	66	5.65
11	BASAGRAN	1.00	POST	0	0	1	55	6.05
	COC	0.25	POST					
12	BASAGRAN	1.00	POST	0	0	3	53	5.72
	COC	0.25	POST					
	UAN32	1.00	POST					
13	DUAL	2.00	PRE	0	94	0	98	7.38
	BASAGRAN	0.500	POST					
14	AMIBEN	2.25	PRE	4	98	3	100	6.72
15	CONTROL			0	0	0	0	4.19
			LSD(0.05) =	6	40	8	26	1.40

Table 3 Crop Injury, Weed Control and Yield Averages From OFF-STATION TRIAL # 3 (Sidney)

TRT. NO.	PESTICIDE NAME	LBai/A	TYPE	BEANS % INJRY 7/24/89	SENVU % CNTRL 7/24/89	CAPBP % CNTRL 7/24/89	BEANS % INJRY 8/14/89	TOTALYD T/ACRE 8/21/89
01	ACIFLUORFEN	A	POST	5	89	88	0	9.04
02	ACIFLUORFEN	B	POST	13	93	96	3	9.07
03	ACIFLUORFEN	B	POSTD	0	0	0	0	9.18
04	ACIFLUORFEN	C	PRE	10	86	94	3	6.98
05	ACIFLUORFEN	D	PRE	41	93	100	13	4.18
06	OXYFLUORFEN	A	BNDBR	0	66	68	0	9.68
	AMIBEN	2.25	BNDOR					
07	OXYFLUORFEN	B	BNDBR	0	93	93	0	9.95
	AMIBEN	2.25	BNDOR					
08	OXYFLUORFEN	C	POSTD	0	0	0	10	7.78
09	OXYFLUORFEN	A	POSTD	0	0	0	29	10.08
10	BASAGRAN	0.50	POST	6	89	95	0	10.54
11	BASAGRAN	0.50	POST	8	94	96	1	9.45
	DASH	0.25	POST					
12	BASAGRAN	0.50	POST	9	91	95	4	9.56
	DASH	0.25	POST					
	UAN32	1.00	POST					
13	BASAGRAN	1.00	POST	9	93	96	0	10.39
14	BASAGRAN	1.00	POST	10	96	96	1	8.09
	DASH	0.25	POST					
15	BASAGRAN	1.00	POST	10	93	98	1	10.23
	DASH	0.25	POST					
	UAN32	1.00	POST					
16	DUAL	2.00	PRE	1	84	98	0	9.33
	BASAGRAN	0.500	POST					
17	AMIBEN	2.25	PRE	9	93	96	1	8.33
18	CONTROL			0	0	0	0	9.01
		LSD(0.05) =		3	16	16	8	2.20

Table 4 Crop Injury, Weed Control and Yield Averages From OFF-STATION TRIAL # 4 (IRISH BEND)

TRT. NO.	PESTICIDE NAME	RATE	TYPE	BEANS %INJURY 8/23/89	AMARE %CONTRL 8/23/89	TOTALYD T/ACRE 9/06/89
01	ACIFLUORFEN	A	POST	10	81	10.45
02	ACIFLUORFEN	B	POST	12	94	10.75
03	ACIFLUORFEN	B	POSTD	6	91	9.34
04	ACIFLUORFEN	C	PRE	3	83	10.67
05	ACIFLUORFEN	D	PRE	9	88	9.13
06	OXYFLUORFEN	A	BNDBR	24	92	6.83
	AMIBEN	2.25	BNDOR			
07	OXYFLUORFEN	B	BNDBR	33	100	8.51
	AMIBEN	2.25	BNDOR			
08	OXYFLUORFEN	C	POSTD	64	80	7.87
09	OXYFLUORFEN	A	POSTD	73	97	6.78
10	BASAGRAN	0.50	POST	0	41	9.26
11	BASAGRAN	0.50	POST	3	58	11.27
	DASH	0.25	POST			
12	BASAGRAN	0.50	POST	7	38	10.91
	DASH	0.25	POST			
	UAN32	1.00	POST			
13	BASAGRAN	1.00	POST	3	50	10.53
14	BASAGRAN	1.00	POST	5	49	9.96
	DASH	0.25	POST			
15	BASAGRAN	1.00	POST	10	43	10.61
	DASH	0.25	POST			
	UAN32	1.00	POST			
17	DUAL	2.00	PRE	0	100	10.06
	BASAGRAN	0.500	POST			
18	AMIBEN	2.25	PRE	1	98	10.59
19	CHECK			0	15	9.00
		LSD(0.05) =		14	35	2.95

Table 5 Crop Injury, Weed Control and Yield Averages From OSU VEGETABLE RESEARCH FARM, CORVALLIS OREGON

TRT. NO.	PESTICIDE NAME	LBai/A	TYPE	BEANS %INJURY 6/05/89	SOLSA % CNTRL 7/10/89	BRSNI % CNTRL 7/10/89	SENVU % CNTRL 7/10/89	TOTALYD T/ACRE 8/03/89
01	CONTROL			0	0	0	0	1.36
02	PROWL	1.50	PPI	16	40	50	0	.97
03	PROWL	0.75	PRE	0	64	60	20	4.69
04	PROWL	1.125	PRE	3	84	83	46	6.21
05	PROWL	1.50	PRE	0	84	85	46	7.28
06	PROWL	3.00	PRE	0	100	100	74	7.69
07	TREFLAN	0.75	PPI	3	97	38	94	5.82
	EPTAM	3.50	PPI					
	DUAL	2.00	PRE					
08	TREFLAN	0.75	PPI	8	99	99	78	7.05
	EPTAM	3.50	PPI					
	AMIBEN	2.25	PRE					
		LSD(0.05) =		8	9	11	26	1.56

[z] COC = crop oil concentrate, a BASF proprietory mixture, was added to treatments where indicated at 1.00 quart per acre.
[y] Dash = BASF surfactant, added to treatments where noted at a rate of 1.00 quart per acre.
[x] PPI = Pre-plant incorporated application.
[w] PRE = Preemergence application.
[v] POST = Postemergence application.
[u] BNDBR = Banded between rows application.
[t] BNDOR = Banded over rows application.

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