

# Garbanzo Bean Weed Control Study

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## **Abstract**

*Pendimethalin (Prowl7) and oxyfluorfen (Goal7) applied preemergence (PREE) caused minimal injury and gave very good weed control (>90%). Goal and sulfentrazone alone applied postemergence (POST) gave very good weed control at 6 WAT. The combination of Prowl followed by Goal or sulfentrazone gave complete control of all weeds. Goal and sulfentrazone applied POST following PREE treatments gave nearly complete weed control with good crop safety. Clomazone (Command7) caused significant crop injury and stand reduction when applied PREE. Metribuzin (Sencor7) applied POST completely reduced the crop stand and gave complete control of all weeds. Metolachlor (Dual7), dimethenamid (Frontier7), Sencor, flumetsulam, and imazamox generally did not provide acceptable control of *Chenopodium desiccatum* (narrowleaf lambsquarters) and *Sonchus oleraceus* (sowthistle). Bentazon (Basagran7), acifluorfen (Blazer7), and fomesafen (Reflex7) were not effective against narrowleaf lambsquarters but gave adequate control of the other weeds.*

## **Introduction**

Garbanzo beans (*Cicer arietinum*) are also known as chickpeas and acreage has increased in Arizona in the past two years. The timing of planting, growing, and harvesting parallels small grain production in the desert. The advantages of growing garbanzos in the desert are that it fixes nitrogen and contributes to improving soil fertility, it is relatively pest free to date, it fits ideally into the crop rotation schemes with melons, and it offers Arizona growers another marketing opportunity. A major disadvantage is that season long weed control is extremely difficult for the slow growing garbanzos. There are only a few soil applied herbicides labeled for use in garbanzos and no effective postemergence (POST) herbicides registered. This field study was conducted to evaluate and determine weed control efficacy and crop safety of several preemergence (PREE) and POST herbicides applied alone or in combinations.

## **Materials and Methods**

A small plot field test was conducted at the University of Arizona Maricopa Agricultural Center, Maricopa, AZ. Garbanzo beans cv. UC-27 were planted on 40-inch beds on 09 December 1998. Herbicide treatment plots were arranged in a randomized complete block design with three replicates. Each plot consisted of two beds and measured 13 ft in length. Herbicide treatments were applied using a hand-held boom equipped with four flat fan 8002 nozzle tips and spaced 20-inches apart. The sprays were applied with a backpack CO<sub>2</sub> sprayer pressurized to 35 psi and delivering 17 gpa water for the PREE treatments and 18 gpa water for the POST treatments. All POST treatments included 0.25% v/v non-ionic surfactant, Latron CS-7. PREE herbicide treatments were applied on 15 December when the air temperature was 72°F, nearly clear with few scattered cloud, a slight wind at 5 mph, and the soil was slightly moist from a trace rainfall prior to the

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applications. The beans were furrow irrigated after applications to germinate and establish the crop. POST herbicide treatments were applied on 03 February 1999 when the air temperature was 54°F, clear, and no winds. The beans were at the stage with three runners with the first runner stem measuring 2-3 inches in length. Weeds present were *Chenopodium desiccatum* (narrowleaf lambsquarters) at the 1-inch height, *Polygonum aviculare* (knotweed) at 1-2 inch height, *Melilotus officinalis* (yellow sweetclover) at 2 trifoliolate stage, *Sonchus oleraceus* (sowthistle) at 2-3 leaf stage, and *Sisymbrium irio* (London rocket) at 10-12 leaf stage or 1-inch diameter. Visual weed control and crop injury were rated after herbicide applications.

## Results and Discussion

Minimal to acceptable garbanzo bean injury was observed for most of the PREE herbicide treatments at 7 weeks after treatment (WAT). Clomazone (Command) caused significant crop injury and stand reduction when applied PREE. Command also provided near complete weed control of narrowleaf lambsquarters, sowthistle, and sweetclover. Pendimethalin (Prowl) and oxyfluorfen (Goal) applied PREE caused minimal injury and gave very good weed control (>90%). Sulfentrazone gave marginally acceptable weed control and marginally acceptable crop injury. Metolachlor (Dual), dimethenamid (Frontier), metribuzin (Sencor), flumetsulam, and imazamox generally did not provide acceptable control of narrowleaf lambsquarters and sowthistle.

At nearly 3 months after treatment (MAT), Prowl continued to provide good weed control of all weeds and no injury was observed on the beans. Frontier, Sencor, and Goal controlled most of the weeds except narrowleaf lambsquarters. Command continued to control weeds and beans did not recover from the initial severe injury.

Most of the POST herbicide treatments were relatively safe on garbanzo beans with less than 10% injury observed at 6 WAT. Sencor applied POST completely reduced the crop stand and gave complete control of all weeds. Goal and sulfentrazone applied POST gave very good weed control at better than 93%. Slight crop injury was observed as a leaf margin burning. Bentazon (Basagran), acifluorfen (Blazer), and fomesafen (Reflex) were not effective against narrowleaf lambsquarters but gave adequate control of the other weeds.

Combinations of PREE applied herbicides followed by POST herbicides demonstrated more effective weed control than when herbicides were applied alone. Goal followed by POST herbicides; Sencor followed by Cobra; and sulfentrazone followed by Reflex or Cobra gave good weed control. Goal followed by most herbicides improved control of narrowleaf lambsquarters.

Prowl applied PREE offered very good weed control for up to 3 MAT. Goal and sulfentrazone alone applied POST gave very good weed control at 6 WAT. The combination of Prowl followed by Goal or sulfentrazone gave complete weed control of all weeds. Goal and sulfentrazone applied POST following PREE treatments gave nearly complete weed control with good crop safety.

Table 1. Garbanzo bean herbicide weed control study. (Umeda and MacNeil)

Treatment	Rate (lb AI/A)	Timing	Crop Injury %	Weed Control		
				CHEAL	SONOL	MEUOF
Untreated check			0	0	0	0
Prowl	1.0	PREE	3	97	97	98
Dual	1.0	PREE	10	40	67	90
Frontier	0.75	PREE	13	48	70	90
Sencor	1.0	PREE	12	48	80	86
Goal	0.25	PREE	3	93	95	99
Command	1.0	PREE	95	99	99	99
Sulfentrazone	0.375	PREE	15	83	85	83
Flumetsulam	0.05	PREE	3	63	63	85
Imazamox	0.05	PREE	5	53	74	78
LSD (p=0.05)			6.8	35.2	13.5	13.6

PREE herbicides applied 15 December 1998, rated 03 February 1999.

CHEAL = *Chenopodium album* (lambsquarters), SONOL = *Sonchus oleraceus* (sowthistle), MEUOF = *Melilotus officinalis* (yellow sweetclover)

Table 2. Garbanzo bean herbicide weed control study. (Umeda and MacNeil)

Treatment	Rate (lb AI/A)	Timing	Crop Injury %	Weed Control			
				CHEAL	SSYIR	POLAV	MEOUF
Untreated check			0	0	0	0	0
Prowl	1.0	PREE	0	92	99	99	99
Dual	1.0	PREE	0	0	93	96	77
Frontier	0.75	PREE	0	17	96	93	90
Sencor	1.0	PREE	0	57	99	96	87
Goal	0.25	PREE	2	77	99	99	96
Command	1.0	PREE	96	98	99	99	99
Sulfentrazone	0.375	PREE	3	73	99	83	72
Flumetsulam	0.05	PREE	0	17	99	80	47
Imazamox	0.05	PREE	2	23	99	93	73
Basagran	1.0	POST	8	57	94	76	83
Blazer	0.375	POST	5	63	99	90	99
Reflex	0.375	POST	5	23	99	94	99
Cobra	0.2	POST	10	88	99	88	98
Goal	0.25	POST	10	95	98	95	93
Sencor	1.0	POST	99	99	99	99	99
Sulfentrazone	0.375	POST	7	99	99	99	98
Goal + Basagran	0.25 + 1.0	PREE + POST	7	88	99	93	99
Goal + Blazer	0.25 + 0.375	PREE + POST	8	93	99	99	99
Goal + Reflex	0.25 + 0.375	PREE + POST	7	92	99	96	99
Goal + Cobra	0.25 + 0.2	PREE + POST	12	98	99	96	99
Goal + Goal	0.25 + 0.25	PREE + POST	10	99	99	99	99
Goal + Sencor	0.25 + 1.0	PREE + POST	99	99	99	95	93
Goal + Sulfentrazone	0.25 + 0.375	PREE + POST	7	99	99	90	92
Sencor + Basagran	1.0 + 1.0	PREE + POST	8	75	99	73	88
Sencor + Blazer	1.0 + 0.375	PREE + POST	8	63	99	75	98
Sencor + Reflex	1.0 + 0.375	PREE + POST	5	78	99	86	98
Sencor + Cobra	1.0 + 0.2	PREE + POST	10	88	99	85	96
Sencor + Goal	1.0 + 0.2	PREE + POST	10	92	99	95	93
Sencor + Sencor	1.0 + 1.0	PREE + POST	99	99	99	99	99
Sencor + Sulfentrazone	1.0 + 0.375	PREE + POST	7	99	99	99	99
Sulfentrazone + Basagran	0.375 + 1.0	PREE + POST	10	77	99	81	87
Sulfentrazone + Blazer	0.375 + 0.375	PREE + POST	10	78	99	88	99
Sulfentrazone + Reflex	0.375 + 0.375	PREE + POST	8	93	99	93	99
Sulfentrazone + Cobra	0.375 + 0.2	PREE + POST	13	95	99	85	96
Sulfentrazone + Goal	0.375 + 0.25	PREE + POST	10	98	98	90	92
Sulfentrazone + Sencor	0.375 + 1.0	PREE + POST	99	99	99	99	99
Sulfentrazone + Sulfentrazone	0.375 + 0.375	PREE + POST	7	99	99	98	96
LSD (p=0.05)			3.8	22.9	3.3	14.7	13.9

PREE herbicides applied 15 December 1998, POST herbicides applied 03 February 1999.

Rated on 15 March 1999.

CHEAL = *Chenopodium album* (lambsquarters), SSYIR = *Sisymbrium irio* (London rocket),

POLAV = *Polygonum aviculare* (knotweed), MEUOF = *Melilotus officinalis* (yellow sweetclover)

Table 3. Garbanzo bean herbicide weed control study, cont'd. (Umeda and MacNeil)

Treatment	Rate (lb AI/A)	Timing	Crop Injury %	Weed Control			
				CHEAL	SSYIR	POLAV	MEUOF
Prowl + Basagran	1.0 + 1.0	PREE + POST	7	95	99	99	98
Prowl + Blazer	1.0 + 0.375	PREE + POST	8	93	99	99	99
Prowl + Reflex	1.0 + 0.375	PREE + POST	5	95	99	99	99
Prowl + Cobra	1.0 + 0.2	PREE + POST	10	96	99	99	99
Prowl + Goal	1.0 + 0.2	PREE + POST	12	99	99	99	99
Prowl + Sencor	1.0 + 1.0	PREE + POST	99	99	99	99	99
Prowl + Sulfentrazone	1.0 + 0.375	PREE + POST	7	99	99	99	99
Dual + Basagran	1.0 + 1.0	PREE + POST	10	42	98	80	75
Dual + Blazer	1.0 + 0.375	PREE + POST	8	47	99	85	99
Dual + Reflex	1.0 + 0.375	PREE + POST	7	40	99	91	99
Dual + Cobra	1.0 + 0.2	PREE + POST	12	82	99	90	99
Dual + Goal	1.0 + 0.2	PREE + POST	10	92	99	92	93
Dual + Sencor	1.0 + 1.0	PREE + POST	99	99	99	99	99
Dual + Sulfentrazone	1.0 + 0.375	PREE + POST	8	99	94	99	93
Frontier + Basagran	0.75 + 1.0	PREE + POST	3	57	99	75	78
Frontier + Blazer	0.75 + 0.375	PREE + POST	8	47	99	83	96
Frontier + Reflex	0.75 + 0.375	PREE + POST	5	48	99	80	99
Frontier + Cobra	0.75 + 0.2	PREE + POST	10	87	99	88	93
Frontier + Goal	0.75 + 0.25	PREE + POST	12	92	99	92	93
Frontier + Sencor	0.75 + 1.0	PREE + POST	99	99	99	99	99
Frontier + Sulfentrazone	0.75 + 0.375	PREE + POST	8	99	99	99	96
Command + Basagran	1.0 + 1.0	PREE + POST	98	94	99	96	93
Command + Blazer	1.0 + 0.375	PREE + POST	96	98	99	98	99
Command + Reflex	1.0 + 0.375	PREE + POST	98	99	99	99	99
Command + Cobra	1.0 + 0.2	PREE + POST	98	99	99	98	99
Command + Goal	1.0 + 0.2	PREE + POST	96	99	99	99	99
Command + Sencor	1.0 + 1.0	PREE + POST	99	99	99	99	99
Command + Sulfentrazone	1.0 + 0.375	PREE + POST	96	99	99	99	99
Flumetsulam + Basagran	0.05 + 1.0	PREE + POST	5	40	99	75	70
Flumetsulam + Blazer	0.05 + 0.375	PREE + POST	7	40	99	86	93
Flumetsulam + Reflex	0.05 + 0.375	PREE + POST	5	65	99	91	99
Flumetsulam + Cobra	0.05 + 0.2	PREE + POST	10	78	99	90	99
Flumetsulam + Goal	0.05 + 0.25	PREE + POST	8	95	96	95	92
Flumetsulam + Sencor	0.05 + 1.0	PREE + POST	99	99	99	99	99
Flumetsulam + Sulfentrazone	0.05 + 0.375	PREE + POST	7	99	99	99	88
Imazamox + Basagran	0.05 + 1.0	PREE + POST	8	77	99	80	83
Imazamox + Blazer	0.05 + 0.375	PREE + POST	5	63	99	83	98
Imazamox + Reflex	0.05 + 0.375	PREE + POST	7	80	99	89	99
Imazamox + Cobra	0.05 + 0.2	PREE + POST	10	77	99	83	96
Imazamox + Goal	0.05 + 0.25	PREE + POST	8	95	99	92	93
Imazamox + Sencor	0.05 + 1.0	PREE + POST	99	99	99	99	99
Imazamox + Sulfentrazone	0.05 + 0.375	PREE + POST	7	99	99	99	91
LSD (p=0.05)			3.8	22.9	3.3	14.7	13.9

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CHEAL = *Chenopodium album* (lambsquarters), SSYIR = *Sisymbrium irio* (London rocket),  
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