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# Effect of weed management on weeds and yield of chickpea varieties (*Cicer arietinum* L.)

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**ABSTRACT** : A field experiment was conducted to response of chickpea cultivars (GG-2, BGD-72, Dahod yellow) to weed management practices under south Gujarat conditions during *Rabi* season of 2011-2012 at Navsari Agricultural University, Navsari, revealed that lowest weed population, lowest dry weight of weed (10.14 kg/ha<sup>-1</sup>), higher seed (1804 kg ha<sup>-1</sup>) and stover (2782 kg ha<sup>-1</sup>) yields were secured under treatment of weed free upto harvest (H.W. at 20, 40 and 60 DAS ) followed by treatment of pendimethalin @ 0.75 kg ha<sup>-1</sup> with one hand weeding at 45 days after sowing. All the varieties found equally suitable with similar yield potential and competitive with weeds for cultivation under South Gujarat conditions.

**KEY WORDS** : Chickpea, *Pendimethalin*, Weed population, Weed management

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**C**hickpea (*Cicer arietinum* L.) is an important pulse crop of India as well as Gujarat. Low yield of this crop may be due to the reason that most of the farmers grow chickpea on neglected soils low in fertility with less or no input facilities. Infestation of weeds, especially at early stages of crop growth, poses considerable threat in achieving desired yield of chickpea crop. Weed reduce grain yield of chickpea upto an extent of 60 per cent (IIPR, 1997). According to Blackshaw (1994) cultivar for sustainable systems should be both high-yielding and competitive against weed. The conventional methods of weed control (hoeing or hand weeding) are labour intensive, expensive, insufficient and may cause damage to the crop. Keeping these facts in view, the present investigation was carried out to find out the response of chickpea (*Cicer arietinum* L.) cultivars

to weed management practices under South Gujarat conditions.

### RESEARCH PROCEDURE

A field experiment was conducted during *Rabi* season of 2011-2012 at the College Farm, Navsari Agricultural University, Navsari. The soil of the experimental field was clayey in texture, low in available nitrogen (254.00 kg ha<sup>-1</sup>), medium in available phosphorus (32.83 kg ha<sup>-1</sup>) and fairly rich in available potash (349.00 kg ha<sup>-1</sup>).

Eighteen treatment combinations consisting of three varieties *viz.*, Dahod yellow (V<sub>1</sub>), GG-2 (V<sub>2</sub>) and BGD-72 (V<sub>3</sub>) and six weed management treatments *viz.*, Unweeded control (W<sub>1</sub>), weed free upto harvest (H.W. at 20, 40 and

60 DAS) ( $W_2$ ), pendimethalin @ 1.00 kg ha<sup>-1</sup> ( $W_3$ ), pendimethalin @ 0.75 kg ha<sup>-1</sup> + H.W. 45 DAS ( $W_4$ ), imazethapyr @ 0.100 kg ha<sup>-1</sup> ( $W_5$ ), and quizalofop-p-ethyl @ 0.05 kg ha<sup>-1</sup> at 15 DAS ( $W_6$ ) were tested by employing Factorial Randomized Block Design (FRBD) with three replications. Chickpea varieties were sown a row spacing of 30 cm during third week of October. The crop was fertilized with recommend dose of 20-50-0 NPK kg/ha.

## RESEARCH ANALYSIS AND REASONING

The findings of the present study as well as relevant discussion have been presented under following heads :

### Effect of varieties :

All varieties of chickpea were found equally suitable with similar yield potential for cultivation under South Gujarat conditions as well as equally competitive with

weeds.

### Effect on weeds :

The experimental field was infested by number of weed species. Among monocot weeds viz., *Echinochloa crusgalli* (L.) Beauv, *Digitaria sanguinalis* (L.) Scop., *Sorghum halepense* (L.) Pers., *Cynodon dactylon* (L.) Pers. and *Bracharia* spp.; dicot weeds, viz., *Amaranthus viridis* L., *Alternanthera sessilis*, *Digera arvensis* Forsk, *Convolvulus arvensis* L., *Trianthema portulacastrum*, *Euphorbia hirta* L., *Euphorbia madurasptiensis* and *Physalis minima* L. and sedges *Cyperus rotundus* (L.) observed in unweeded control plot during the course of experimentation.

Significantly the highest weed population (Table 1) of monocot, dicot, and sedge were noted under unweeded control ( $W_1$ ) at all the growth stages of chickpea. All the weed management treatments

Treatments	Weed pop. at 20 DAS			Weed pop. at 40 DAS			Weed pop. at 60 DAS			Weed pop. at harvest		
	Monocot	Dicot	Sedge	Monocot	Dicot	Sedge	Monocot	Dicot	Sedge	Monocot	Dicot	Sedge
<b>Varieties (V)</b>												
$V_1$ = Dahod yellow	7.62	9.35	8.12	5.85	7.31	6.53	5.58	7.09	6.00	5.35	6.91	6.31
$V_2$ = GG-2	7.56	9.18	8.04	5.71	7.18	6.47	5.52	7.02	5.9	5.30	6.84	6.30
$V_3$ = BGD-72	7.60	9.31	8.09	5.78	7.26	6.50	5.55	7.06	5.95	5.33	6.89	6.29
S.E. $\pm$	1.35	2.13	1.50	0.73	1.07	0.95	0.81	1.24	0.86	0.58	1.16	0.90
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Weed management (W)</b>												
$W_1$ =Unweeded Control	9.18	11.38	9.36	9.55	12.31	11.15	10.2	12.83	10.89	9.95	12.87	10.93
$W_2$ =Weed free up to harvest (H.W.20, 40 and 60 DAS)	8.85	10.27	9.7	2.93	3.10	2.99	2.55	2.96	2.78	2.33	2.55	3.01
$W_3$ =Pendimethalin @ 1.00 kg/ha	3.52	4.45	4.60	4.57	4.87	5.07	3.70	4.11	4.22	3.42	3.58	4.75
$W_4$ = Pendimethalin @ 0.75 kg/ha +1 H.W. at 45 DAS	3.55	4.72	4.98	4.51	4.85	4.96	3.12	3.68	3.32	2.75	3.32	4.41
$W_5$ = Imazethapyr @ 0.1 kg/ha at 15 DAS	8.93	11.07	9.50	5.55	7.64	6.05	5.21	7.14	5.52	7.97	6.82	5.95
$W_6$ =Quizalofop-p-ethyl @ 0.05 kg/ha at 15 DAS	8.87	10.77	9.26	5.36	6.97	5.82	4.89	6.61	5.26	4.68	6.42	5.50
S.E. $\pm$	1.91	3.01	2.12	1.03	1.51	1.35	1.14	1.76	1.22	0.83	1.64	1.27
C.D. (P=0.05)	5.48	8.64	6.09	2.97	4.35	3.38	3.28	5.05	3.51	2.38	4.72	3.66
<b>Interaction</b>												
$V \times W$	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	9.90	10.46	9.72	9.27	8.62	9.56	11.08	10.58	10.30	8.73	10.39	9.70

Data of weed population are after  $\sqrt{X}$  transformed value  
NS = Non significant;

HW = Hand weeding;

DAS= days after sowing;  
HH = Hand hoeing

significantly reduced the population of weeds compared to unweeded control. At 20 DAS minimum population was observed in the treatment  $W_3$  (Pre-emergence application pendimethalin @ 1.00 kg/ha) which was at par with treatment  $W_4$ . At 40 DAS minimum population observed in the treatment  $W_2$  (H.W. at 20, 40 and 60 DAS) which was followed by treatment  $W_4$  and  $W_3$  significantly at 60 DAS and at harvest treatment  $W_2$  (H.W. at 20, 40 and 60 DAS) being at par with treatment  $W_4$  (Pre-emergence application of pendimethalin @ 0.75 kg/ha + HW 45 DAS) which recorded minimum population of all types of weed. This might be due to effective weed control in respective treatments either manual or herbicidal or both resulted in remarkable reduction in weed population. These findings are in close agreement with those reported by Ahlawat (1978), Balyan *et al.* (1987), Chaudhary *et al.* (2005), Patel *et al.* (2006a and b).

The highest dry matter of weeds (Table 2) at 60 DAS and at harvest was observed in unweeded control ( $W_1$ ) treatment. Treatment  $W_2$  (weed free upto harvest- H.W. at 20, 40 and 60 DAS) recorded the lowest dry weight of weeds followed by treatment  $W_4$  (pendimethalin @ 0.75 kg ha<sup>-1</sup> + 1 H.W. at 45 DAS) and  $W_3$  (pendimethalin @

1.00 kg ha<sup>-1</sup>). These findings are in close agreement with those reported by Chaudhary *et al.* (2005) and Gousia Begum and Rao (2006); Rao and Rao (2006); Ahuja and Yaduraju (1995), Sesharee *et al.* (1996), Balyan *et al.* (1987).

#### Effect on crop :

Various weed management treatments influenced significantly the seed and stover yield of chickpea (Table 2). Significantly the highest seed yield and stover yield were recorded under treatment  $W_2$  (Weed free upto harvest- H.W. at 20, 40 and 60 DAS) being at par with treatment  $W_4$  (pendimethalin @ 0.75 kg ha<sup>-1</sup> + 1 H.H at 45 DAS) and  $W_5$  (pendimethalin @ 1.00 kg ha<sup>-1</sup>). Significantly the lowest seed and stover yields were recorded under unweeded control treatment ( $W_1$ ). The remarkable increase in seed and stover yield under these treatments ( $W_2$ ,  $W_4$  and  $W_3$ ) might be due to effective control of weeds in terms of reduced weed population and dry weight of weeds. These findings are in close agreement with those reported by Ahuja and Yaduraju (1995), De *et al.* (1995) and Lalakiya (1993). The results concluded that higher profitable yield of chickpea on vertisols of South Gujarat can be obtained by using either

**Table 2 : Dry weight of weed at 60 DAS and at harvest, seed and stover yield of chickpea crop influenced by various weed management treatments**

Treatments	Dry weight of weeds		Seed yield (kg ha <sup>-1</sup> )	Stover yield (kg ha <sup>-1</sup> )	Harvest index (%)
	60 DAS (kg/ha <sup>1</sup> )	At harvest (kg/ha <sup>1</sup> )			
<b>Varieties (V)</b>					
V <sub>1</sub> = Dahod yellow	19.33	24.35 (593.17)	1534	2325	39.72
V <sub>2</sub> = Co-4	18.93	23.81 (567.17)	1585	2454	39.18
V <sub>3</sub> = RTM-1	19.17	24.51 (583.33)	1545	2383	39.47
S.E. ±	12.88	14.50	41	46.07	0.68
C.D. (P=0.05)	NS	NS	NS	NS	NS
<b>Weed management (W)</b>					
W <sub>1</sub> =Unweeded Control	26.13	31.39 (985.67)	1140	1939	37.03
W <sub>2</sub> = Weed free up to harvest (H.W.20, 40 and 60 DAS)	10.14	16.15 (261.00)	1804	2782	39.34
W <sub>3</sub> = Pendimethalin @ 1.00 kg/ha	15.15	20.40 (416.33)	1680	2602	39.23
W <sub>4</sub> = Pendimethalin @ 0.75 kg/ha +1 H.W. at 45 DAS	12.91	17.67 (312.33)	1720	2672	39.16
W <sub>5</sub> = Imazethapyr @ 0.1 kg/ha at 15 DAS	23.62	27.67 (765.67)	1461	2126	40.73
W <sub>6</sub> = Quizalofop-p-ethyl @ 0.05 kg/ha at 15 DAS	21.43	26.19 (686.33)	1545	2201	41.26
S.E. ±	18.22	18.22	57.99	65.16	0.96
C.D. (P=0.05)	52.36	52.36	166.63	187.24	NS
<b>Interaction</b>					
V X W	NS	NS	NS	NS	NS
C.V.%	14.91	14.91	11.16	8.19	7.28

HW= hand weeding; HH= hand hoeing; DAS= days after sowing,

Data of weed dry weight are after  $\sqrt{x}$  transformed value

NS=Non-significant

The data in parentheses indicate original value

Dahod yellow, GG-2 and BGD-72 variety of chickpea and by keeping them weed free by hand weedings or by pre-emergence application of pendimethalin @ 0.75 kg ha<sup>-1</sup> coupled with one hand hoeing at 45 days after sowing.

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