

Weed control in chickpea (*Cicer arietinum*) under late-sown condition

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ABSTRACT

A field experiment was conducted during the winter season of 1993–94 to 1995–96 at Pulse Research Station, R.A.K. College of Agriculture, Sehore, Madhya Pradesh, to study the effect of weed-management practices on chickpea (*Cicer arietinum* L.) under late-sown condition. Two hand-weedings at 30 and 45 days after sowing (DAS) (weed-free) completely controlled the weeds. Significantly lowest weed dry matter and highest weed-control efficiency were observed when 1 hand-weeding was done at 45 DAS. This treatment was followed by integration of 1 hand-weeding at 45 DAS with pre-emergence application of pendimethalin 0.75 kg/ha in reducing weed dry matter and in increasing the weed-control efficiency. Significantly higher grain yield (1,723 kg/ha) was recorded in weed-free plots. Among the weed-control treatments, pendimethalin 0.75 kg/ha coupled with 1 hand-weeding at 45 DAS recorded higher grain yield (1576 kg/ha).

Key words : Chickpea, Weed control, Weed biomass, Grain yield, Economics

Madhya Pradesh is occupying the highest acreage (2.74 m/ha) under chickpea, contributing 46% of the total production in the country. Traditionally, it is grown as rainfed crop under monocropping system in the state. In the recent years, chickpea has been introduced into multiple cropping systems under limited irrigation. Under irrigated condition, simultaneous emergence and rapid growth of weeds along with chickpea crop in the fields caused severe weed – crop competition in early stage. Weeds reduce grain yield of chickpea 60% (IIPR, 1997).

In view of paucity of information on weed management in late-sown chickpea or gram, an investigation was undertaken at Sehore, Madhya Pradesh.

MATERIALS AND METHODS

A field experiment was conducted at Main Pulse Research Station, R.A.K. College of Agriculture, Sehore, during the winter season of 1993–94, 1994–95 and 1995–96. The soil of the experimental site was medium black, having pH 7.8, available nitrogen (195 kg/ha), phosphorus (9.7 kg/ha) and potash (315 kg/ha) respectively. Fourteen treatments comprising pendimethalin, oxyfluorfen and metolachlor applied at different rates and times alone and in combination with manual weeding, weed-free and unweeded control were replicated 4 times in randomized

block design (Table 1). The chickpea variety 'JG 74' was sown in rows 30 cm apart with seed rate of 100 kg/ha. The dose of fertilizer N₂₀, P₂₆ and K₁₆ was applied before sowing. The seed treatment with thirum @ 2.5 g/kg seed and *Rhizobium* bacterial culture @ 10 g/kg seed was done respectively. Chickpea was sown in the second fortnight of November and was harvested in the second fortnight of March. The crop was sown with pre-sown irrigation followed by 1 irrigation at pre-flowering stage.

RESULTS AND DISCUSSION

The dominant weed species observed in the experimental fields included *Chenopodium album* L., *Anagallis arvensis* L., *Melilotus indica* L., *Argemone maxicana* L., *Lauena pinnatifolia* L., *Convolvulus arvensis* L., *Euphorbia hirta* L. etc.

Dry weed biomass

The hand-weeding (weed-free) at 30 and 45 days after sowing plots were almost weed free up to harvesting stage. All manual and herbicidal treatments alone and in combination, significantly reduced dry weed biomass compared to unweeded control (Table 1). Hand-weeding at 30 DAS recorded the lowest dry weed biomass and it gave highest weed-control efficiency (53.86%), but was

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statistically at par with the pre-emergence application of pendimethalin 0.75 kg/ha, metolachlor 0.75 kg/ha and post-emergence oxyfluorfen 0.05 kg/ha supplemented with 1 hand-weeding at 45 days after sowing. However, during the first year hand-weeding once at 45 days after sowing, oxyfluorfen 0.10 kg/ha as post-emergence and

pendimethalin 1.00 kg/ha PE were also at par with 1 hand-weeding at 30 DAS. Among application of different herbicidal treatments minimum dry weed biomass and maximum weed-control efficiency were recorded with pre-emergence application of pendimethalin 1.00 kg/ha and post-emergence oxyfluorfen 0.10 kg/ha. Further,

Table 1. Dry weed biomass, weed-control efficiency and weed index in chickpea as affected by different weed control methods

Treatment	Dose (kg a.i./ha)	Weed dry weight (kg/ha)				WCE (%)	Weed index (%)
		1993-94	1994-95	1995-96	Mean		
Control (weedy check)		361	396	407	388		45.73
Weed-free (HW at 30, 45 DAS)		0	0	0	0		
1 HW at 30 DAS		167	175	196	179	53.86	9.63
1 HW at 45 DAS		195	287	292	258	33.50	22.51
1 HW at 60 DAS		204	304	305	271	30.15	33.02
Pendimethalin pre-em	0.75	290	293	308	207	23.45	26.69
Pendimethalin pre-em	1.00	183	252	247	227	41.49	13.98
Oxyfluorfen post-em	0.05	261	250	272	261	32.73	21.93
Oxyfluorfen post-em	0.10	171	210	239	296	46.90	29.19
Metolachlor pre-em	0.75	308	331	286	308	20.61	27.80
Metolachlor pre-em	1.00	246	241	251	246	36.59	19.09
Pendimethalin+1 HW at 45 DAS	0.75	166	190	186	180	53.60	8.58
Oxyfluorfen+1 HW at 45 DAS	0.05	167	202	203	190	51.03	18.63
Metolachlor + 1 HW at 45 DAS	0.75	196	190	202	196	49.48	17.06
CD (P=0.05)		31	28	41	33		

DAS, Days after sowing; HW, Hand-weeding; WCE, Weed control efficiency; Pre-em, pre-emergence; Post-em, post-emergence

Table 2. Growth, yield characters, additional net return and seed yield under different methods of weed control

Treatment	Three years mean values						Grain yield (kg/ha)			
	Dose (kg a.i./ha)	Plant height (cm)	Branches/ plant	Pods/ plant	100- seed weight (g)	Additional net return (Rs/ha) over control	1993- 94	1994- 95	1995- 96	Mean
Control (Weedy check)		27.4	3.5	26.2	15.4		963	949	895	935
Weed-free (HW at 30, 45 DAS)		32.2	5.4	34.0	17.3	7,483	1,965	1,678	1,527	1,723
1 HW at 30 DAS		32.2	5.1	32.5	16.4	5,908	1,810	1,412	1,450	1,557
1 HW at 45 DAS		30.0	4.5	28.3	15.8	3,800	1,562	1,273	1,172	1,335
1 HW at 60 DAS		29.6	4.2	28.6	15.6	2,077	1,249	1,134	1,080	1,154
Pendimethalin pre-em	0.75	29.1	4.4	28.3	16.3	3,116	1,372	1,262	1,157	1,263
Pendimethalin pre-em	1.00	30.6	5.0	31.5	16.4	5,196	1,679	1,389	1,380	1,482
Oxyfluorfen post-em	0.05	28.9	4.3	27.5	16.3	2,939	1,366	1,227	1,442	1,345
Oxyfluorfen post-em	0.10	29.0	4.1	28.5	16.2	2,707	1,503	1,064	1,095	1,220
Metolachlor pre-em	0.75	29.5	4.2	27.0	16.2	2,910	1,249	1,296	1,188	1,244
Metolachlor pre-em	1.00	30.0	4.0	29.9	16.3	4,340	1,395	1,412	1,373	1,394
Pendimethalin + 1 HW at 45 DAS	0.75	31.2	5.2	32.3	16.4	6,083	1,731	1,516	1,481	1,576
Oxyfluorfen + 1 HW at 45 DAS	0.05	30.9	4.5	31.5	16.3	4,436	1,581	1,377	1,250	1,402
Metolachlor + 1 HW at 45 DAS	0.75	27.4	4.2	31.1	16.2	4,654	1,437	1,493	1,358	1,429
CD (P=0.05)		2.6	0.4	4.6	4.0		159	97	116	124

minimum dry weed biomass at harvest weed-control efficiency (53.60%) were recorded with pre-emergence pendimethalin 0.75 kg/ha + 1 hand-weeding at 45 days after sowing.

Growth and yield attributes

The uncontrolled weeds affected the crop adversely. All weed-control methods recorded significantly higher plant height, branches/plant, pods/plant and 1,00-seed weight compared to unweeded control. The adverse effect might be due to the competitive stress for available resources to be shared by the crop and weeds. Maximum values of these characters were observed in weed-free condition, followed by 1 hand-weeding at 30 DAS, pendimethalin 1.00 kg/ha as pre-emergence and pendimethalin 0.75 kg/ha + 1 hand-weeding at 45 DAS.

Grain yield

All the weed-control methods gave significantly higher grain yield than unweeded control during all the 3 years. Weed-free (2 hand-weedings at 30 and 45 days after sowing) recorded highest grain yield (1,723 kg/ha) of chickpea during all the years and was at par with 1 hand-weeding at 30 days after sowing and pre-emergence application of pendimethalin 0.75 kg/ha supplemented with 1 hand-weeding at 45 days after sowing except

during 1993–94. Pre-emergence application of pendimethalin 1.00 kg/ha recorded higher grain yield (1,482 kg/ha). Due to poor growth and effective control of weeds under these treatments, weeds were unable to compete with the crop plants and resulted in better expression of growth and yield-attributing characters thus gave higher yield. This confirms the findings of Singh *et al* (1986) and Yadav *et al.* (1983).

Additional returns

Additional net return over the unweeded control were the maximum (Rs 7,483/ha) under 2 hand-weedings (weed-free) at 30 and 45 days after sowing, followed by pre-emergence pendimethalin 0.75 kg/ha + 1 hand-weeding at 45 DAS (Rs 6,083/ha), 1 hand weeding at 30 DAS (Rs 5,906/ha) and pendimethalin 1.00 kg/ha (Rs 5,196/ha) as pre-emergence.

REFERENCES

- IIPR. 1997. *Annual Report, Indian Institute of Pulses Research*, Kanpur, pp. 18–19.
- Singh, A., Ahlawat, I.P.S. and Saraf, C.S. 1986. Studies on weed control in chickpea. *Indian Journal of Agronomy* 31(3) : 269–272.
- Yadav, S.K., Singh, S.P. and Bhan, V.M. 1983. Weed control in chickpea. *Tropical Pest Management* 29 (3) : 297–298.