Indian J. Weed Sci. **43** (1 & 2) : 70-72 (2011)

Integrated Weed Management in Chickpea (*Cicer arietinum* L.)

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ABSTRACT

A field experiment was conducted during **rabi** 2006-07 to 2008-09 at RARS, Lam Farm, Guntur to find out most suitable integrated weed management practice for control of weeds in chickpea. Results indicated that weed control treatments significantly reduced the density and dry weight of weeds in chickpea. Post-emergence application of imazethapyr 63 g/ha caused 20% crop injury among the herbicides under study. Integrated treatments were found to be superior (83-89% WCE) to alone application of herbicides. Among the treatments, pre-emergence application of oxyfluorfen 100 g/ha fb hand weeding at 30 DAS recorded maximum (2272 kg/ha) and was on par with all other integrated treatments and also with hand weeding at 15 and 30 DAS. Among the individual herbicides, pre-emergence application of pendimethalin 1.5 kg /ha recorded maximum grain yield and was on par with other individual herbicides.

Key words : Integrated weed management, imazethapyr, oxyfluorfen, crop injury

INTRODUCTION

Chickpea, the world's third most important food legume, is used in salad and to cook various dishes. It is a good source of zinc and protein. The yield of chickpea has fallen due to various production constraints such as biotic and abiotic factors. Biotic constraints wilt, dry root rot and blight are the major. In addition to that the weeds also contributed major loss in yield by competing space, nutrients, water and light. Chickpea is poor competitor to weeds because of slow growth rate and limited leaf development at early stage of crop growth and establishment, if weed management is neglected under these conditions, resulting in yield loss of 40 to 87%. Chickpea is generally grown on marginal and sub-marginal soils under rainfed conditions with low inputs (Solh and Pala, 1990). The information on weed management in Krishna zone is negligible. Hence, this investigation was taken with an objective to find out most suitable integrated weed management practice for control of weeds in chickpea.

MATERIALS AND METHODS

A field experiment was conducted during **rabi** 2006-07, 2007-08 and 2008-09 at Regional Agricultural Research Station, Lam Farm, Guntur, Andhra Pradesh. The soil of the experimental field was clay loam in texture with medium in available nitrogen and available phosphorus and high in available potassium with a pH of 7.7. The experiment consisting of 10 treatments (Table 1) was laid out in randomized block design with three replications. After thorough preparation of land the treated chickpea seed was sown by adopting the spacing of 30 x 20 cm. Before sowing, entire dose of nitrogen and phosphorus was applied as basal as per the recommendations of ANGRAU. The pre- and post-emergence herbicide treatments were imposed during November and December months as per schedule, respectively. The crop was irrigated at 40 DAS. There were no major pests and diseases during the season except during the initial stage of the crop. *Spodoptera* sp. was noticed and it was controlled by spraying chloripyriphos and indoxicarb. Weed density was recorded at 30, 60 DAS and at harvest and weed dry weight was recorded at harvest only. The data on weed density and dry weight were subjected to square root $\sqrt{x+0.5}$ transformation before statistical analysis to normalize their distribution. Data for individual years were pooled and statistically analyzed.

RESULTS AND DISCUSSION

Effect on Weeds

The dominant weed flora of the experimental plots were grasses (*Echinochloa* spp., *Panicum* spp., *Sporobolus* and *Cynodon dactylon),* sedges (*Cyperus rotundus*) and broadleaf weeds (*Chrozophora rottleri, Phyllanthus niruri, Aristolochia bracteata, Trianthema*

Table 1. Effect of different weed management treatments on weed density and dry weight at different growth stages of chickpea (Pooled data of three years)

Treatments	Dose (g/ha)	Time of application (DAS)	Weed density (No./m^2)			Dry weight of weeds (g/m^2) at harvest	WCE (%) at harvest
			30 DAS	60 DAS	At harvest		
T_1–Unweeded check	-	-	12.8 (164.34)	10.8 (117.14)	11.9 (142.11)	19.6 (384.66)	-
T_2–Hand weeding	-	15 & 30	3.8 (14.94)	2.1 (4.91)	2.4 (6.26)	1.8 (3.24)	90
T_3–Pendimethalin	1500	3	6.3 (40.19)	6.2 (38.94)	5.7 (32.99)	7.2 (51.84)	63
T_4–Oxyfluorfen	100	3	5.9 (35.31)	6.0 (36.50)	5.8 (34.14)	7.1 (50.91)	64
T_5–Pretilachlor	500	3	7.1 (50.91)	6.5 (42.75)	5.9 (35.31)	10.5 (110.75)	46
T_6–Imazethapyr	63	15	5.6 (31.86)	7.6 (58.26)	5.6 (31.86)	6.8 (46.74)	65
T_7–T_3 fb HW	1500	3 & 30	3.9 (15.71)	1.9 (4.11)	3.2 (10.74	2.6 (7.26)	86
T_8–T_4 fb HW	100	3 & 30	4.1 (17.31)	2.1 (4.91)	3.6 (13.46)	3.2 (10.74)	83
T_9–T_5 fb HW	500	3 & 30	5.6 (31.86)	2.9 (8.91)	3.8 (14.94)	2.7 (7.79)	86
T_{10}–T_6 fb HW	63	15 & 30	3.3 (11.39)	2.8 (8.34)	3.2 (10.74)	2.1 (4.91)	89
LSD (P=0.05)	-	-	3.43	1.61	2.06	4.91	

DAS–Days after sowing.

portulacastrum, Portulaca oleracea and *Digera arvensis)*.

A perusal of the dat on weed density indicated that all the weed control treatments significantly reduced the total weed density over weedy check at all stages of observation (Table 1). At harvest all the weed control treatments significantly reduced weed dry weight. All the integrated treatments were significantly superior to alone application of herbicides in reducing weed density at 30, 60 DAS and weed dry weight at harvest and recorded WCE of 86 to 89%. Among the treatments, post-emergence application of imazethapyr 63 g/ha fb hand weeding at 30 DAS recorded the highest WCE of 89% and was on par with other integrated treatments and hand weeding also.

Effect on Crop

No crop injury was observed with the pre emergence herbicides applied under study. However, post-emergence application of imazethapyr 63 g/ha caused slight injury (20%) to chickpea but recovered subsequently. All the weed control treatments significantly recorded higher plant height over unweeded check (Table 2).

Number of branches, number of pods per plant

Table 2. Effect of different weed management treatments on yield and yield components of chickpea (Pooled data of three years)

Treatments	Dose (g/ha)	Time of application (DAS)	Crop injury (%)	Plant height (cm)	No. of branches/ plant	No. of pods/ plant	100-seed weight (g)	Yield (kg/ha)	Cost of treatment (Rs./ha)	B : C ratio
T_1–Unweeded check	-	-	-	38.1	2.5	20.1	20.8	1283	0	-0.34
T_2–Hand weeding	-	15 & 30	-	45.6	3.7	51.4	24.6	2534	2250	0.24
T_3–Pendimethalin	1500	3	-	45.9	3.2	28.7	24.0	2063	1030	0.04
T_4–Oxyfluorfen	100	3	-	43.8	2.9	32.9	22.4	2042	1100	0.03
T_5–Pretilachlor	500	3	-	44.1	2.7	30.9	22.0	1849	500	-0.06
T_6–Imazethapyr	63	15	20	44.4	3.2	33.3	22.9	1919	1000	0.00
T_7–T_3 fb HW	1500	3 & 30	-	45.5	3.2	39.2	23.2	2231	1750	0.10
T_8–T_4 fb HW	100	3 & 30	-	46.8	3.0	38.2	22.5	2272	1850	0.12
T_9–T_5 fb HW	500	3 & 30	-	45.5	3.1	38.3	23.1	2199	1250	0.10
T_{10}–T6 fb HW	63	15 &30	20	43.1	3.1	38.9	22.3	2105	1750	0.04
LSD (P=0.05)	-	-		3.29	NS	13.32	NS	438.74	0	-

DAS–Days after sowing. NS–Not Significant.

and grain yield were significantly influenced by the weed control treatments (Table 2). Among the treatments, pre-emergence application of oxyfluorfen 100 g/ha fb hand weeding recorded maximum grain yield of 2272 kg/ha and was on par with other integrated treatments. Among the alone application of herbicides, pre-emergence application of oxyflourfen @ 100 g/ha recorded highest seed yield (2221 kg/ha) followed by imazethapyr 63 g/ha (2090 kg/ha) and all the treatments were on par with integrated treatments but significantly lower than hand weeding which recorded the highest seed yield of 2534 kg/ha. The increased yield in these treatments might be due to the proper utilization of moisture, nutrients, light and space by the chickpea crop in the absence of weed competition. The results are corroborating with those reported by Arya (2004) and Patel *et al*. (2006). Unweeded check recorded the lowest yield (2450 kg/ha) with an yield loss of 43% compared to two hand weedings.

Among the weed management treatments, highest BCR (0.12) was observed with the treatment, pre-emergence application of oxyfluorfen 100 g/ha fb hand weeding at 30 DAS and none of the treatments could reach the level of hand weeding which recorded the highest BCR (0.24). From the three years' study, it can be concluded that pre-emergence application of oxyfluorfen 100 g/ha fb hand weeding at 30 DAS was found to be effective and economical when labour problem was there.

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