

## Weed Management in Pearl Millet (*Pennisetum glaucum*) with Special Reference to *Trianthema portulacastrum*

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### ABSTRACT

Intercropping, hand weeding and herbicides were found effective in reducing the weed density and weed biomass and in enhancing grain and stover yield of pearl millet over weedy check but application of herbicides followed by one hand weeding was found much more effective. Oxyfluorfen fb hand weeding at 25 DAS recorded 92.3 and 95% less population and dry matter of *Trianthema portulacastrum* and 86.1 and 91% less population and dry matter, respectively, of all other weeds, and thus gave 24.96% more pearl millet yield and highest net return.

### INTRODUCTION

Pearl millet [*Pennisetum glaucum* (L.) R. Br. emend. Stuntz] is an important dual purpose rainy season crop of Rajasthan. It provides staple food for poor in short period in the relatively dry tracts which flourishes well even under adverse conditions of weather. Weeds emerge alongwith the crop during rainy season which cause serious competition with the crop plants during initial slow growth period resulting in seed yield loss upto 40% or more (Sharma and Jain, 2003). Carpetweed (*Trianthema portulacastrum*) is one of the important weeds, which causes severe loss depending upon season (Bhan and Malik, 1986). The emergence and serious competition of carpetweed (*T. portulacastrum*) and barnyard grass (*Echinochloa colona*) reduced yield of this crop to an extent of 61 to 94% (Punia *et al.*, 2004). For control of weeds, several methods have been tried with varying degrees of success. However, these methods provide control of grassy weeds. Keeping the serious problem of carpetweed (*T. portulacastrum*) in mind, it was considered necessary to undertake a study to work out suitable integrated weed management strategy involving herbicidal and/or manual methods in pearl millet.

### MATERIALS AND METHODS

Field experiment was conducted during kharif

seasons of 2001 to 2003 at the experimental farm of Agricultural Research Station, Kumher (Bharatpur) situated in flood prone eastern plane Zone of Rajasthan. Soil of the experimental sight was sandy loam in texture, alkaline in reaction (pH 8.3) with low nitrogen, moderate phosphate and high potash status. Nine treatments of weed control measures (Weedy check, hand weeding at 25 DAS, intercropping with clusterbean (6 : 1 row), atrazine at 0.5 kg ha<sup>-1</sup>, alachlor at 1.0 kg ha<sup>-1</sup>, oxyfluorfen at 0.2 kg ha<sup>-1</sup>, atrazine followed by hand weeding at 25 DAS, alachlor followed by hand weeding at 25 DAS and oxyfluorfen followed by hand weeding at 25 DAS) were laid out in randomised block design with three replications. Pearl millet variety H. H. B-67 was sown during last week of June every year at a row spacing of 40 cm at seed rate of 4 kg ha<sup>-1</sup> and raised with full recommended package of practices. All the herbicides were applied as pre-emergence after two days of sowing. A knapsack sprayer was used to spray herbicides at a spray volume of 600 l ha<sup>-1</sup>. The weed population and weed dry weight of *T. portulacastrum* and other weeds were recorded at 40 DAS and at harvest by placing a quadrat of 0.25 m<sup>2</sup> randomly at three places in each plot.

### RESULTS AND DISCUSSION

#### Effect on Weeds

*T. portulacastrum* was the major weed of the

Table 1. Effect of treatments on weeds in pearl millet (Average of three crop seasons)

Treatment	Dose (g ha <sup>-1</sup> )	Weed density (No. m <sup>-2</sup> )				Weed dry weight (g m <sup>-2</sup> )			
		40 DAS		At harvest		40 DAS		At harvest	
		<i>T. portulacastrum</i>	Others	<i>T. portulacastrum</i>	Others	<i>T. portulacastrum</i>	Others	<i>T. portulacastrum</i>	Others
Weedy	-	5.05* (25)	9.41 (88)	6.29 (39)	11.73 (137)	20.4	66.1	37.5	105.6
Hand weeding at 25 DAS	-	3.24 (10)	6.44 (41)	3.94 (15)	7.78 (60)	8.0	30.3	13.1	49.7
Intercropping with clusterbean	-	4.06 (16)	7.38 (54)	4.53 (20)	8.34 (69)	11.3	35.0	9.7	25.4
Atrazine	500	4.92 (19)	6.89 (47)	5.15 (26)	8.09 (65)	12.1	25.3	20.3	38.3
Alachlor	1000	4.30 (18)	7.31 (53)	4.95 (24)	8.46 (71)	14.0	38.2	23.1	57.6
Oxyfluorfen	200	3.08 (9)	6.52 (42)	3.39 (11)	7.04 (49)	6.1	34.8	8.7	50.2
Atrazine fb HW at 25 DAS	500	2.92 (8)	6.44 (41)	3.24 (10)	5.52 (30)	5.5	23.8	4.5	14.5
Alachlor fb HW at 25 DAS	1000	3.08 (9)	7.04 (49)	3.08 (9)	5.87 (34)	6.0	32.7	6.3	23.9
Oxyfluorfen fb HW at 25 DAS	200	2.12 (4)	5.96 (35)	1.87 (3)	4.42 (19)	2.8	18.0	2.2	9.5
LSD (P = 0.05)	-	1.25	1.09	1.60	2.84	2.3	4.7	2.06	5.8

\*Values are ( $\sqrt{x+0.5}$ ) transformed and actual values are given in parentheses.  
DAS-Days after sowing, HW-Hand weeding, fb-followed by.

Table 2. Effect of treatments on weeds and pearl millet (Average of three crop seasons)

Treatment	Dose (g ha <sup>-1</sup> )	Crop dry weight (g m <sup>-2</sup> ) 50 DAS	Effective tillers plant <sup>-1</sup>	Grain yield (kg ha <sup>-1</sup> )	Straw yield (kg ha <sup>-1</sup> )	Cost of treatments (Rs. ha <sup>-1</sup> )	Net return due to weed control (Rs. ha <sup>-1</sup> )
Weedy	-	30.5	2.0	1807	4030	-	-
HW at 25 DAS	-	38.3	2.4	2283	4808	1800	3912
Intercropping with clusterbean	-	36.9	2.6	2228	4904	1180	3812
Atrazine	500	34.7	2.3	2211	4768	1100	3738
Alachlor	1000	34.0	2.3	2189	4730	1150	3234
Oxyfluorfen	200	35.9	2.5	2215	4876	1400	3496
Atrazine fb HW at 25 DAS	500	39.7	2.7	2346	5115	2900	3568
Alachlor fb HW at 25 DAS	1000	39.0	2.6	2335	5090	2950	3386
Oxyfluorfen fb HW at 25 DAS	200	42.2	3.3	2408	5220	3200	4012
LSD (P= 0.05)	-	4.6	0.2	113	578	-	-

experimental field constituting more than 28% of the total weed population recorded at 40 DAS (Table 1). The other weeds with low density *Tribulus terrestris*, *Cyperus rotundus*, *Amaranthus viridis*, *Amaranthus spinosus*, *Cyperus compressus*, *Euphorbia* spp., *Echinochloa colona* and *Cynodon dactylon* were found infesting the field. There was reduction in the weed density and weed dry matter production due to various weed control treatments when compared with weedy check. Weed control efficiency of hand weeding, intercropping with clusterbean and pre-emergence application of all the herbicides alone was almost similar. The efficiency of these herbicides was increased when hand weeding was done at 25 days stage. Pahwa and Bajaj (2000) have reported similar type of results. Oxyfluorfen at 0.2 kg ha<sup>-1</sup> applied as pre-emergence followed by hand weeding at 25 DAS controlled *T. portulacastrum* effectively (WCE 92.3%) and proved superior to all other treatments during all the years of study. The highest WCE (86.13%) in controlling all other weeds was also recorded due to this treatment (Table 2). However, other herbicides proved to control the total weed biomass but found less effective on *T. portulacastrum*. The maximum density of *T. portulacastrum* (24.4 m<sup>-2</sup>) was recorded under weedy (control) and lowest (4.4 m<sup>-2</sup>) in oxyfluorfen fb hand weeding at 25 DAS. Intercropping with clusterbean, hand weeding at 25 DAS and herbicides were also found effective in reducing the total weed density and weed biomass

at 40 days stage and at harvesting stage. Herbicides fb hand weeding at 25 DAS were found much more effective. The results of three years experimentation pooled data revealed that oxyfluorfen fb hand weeding at 25 DAS had 92.3 and 94.1% less population and dry matter of *T. portulacastrum* and 86.1 and 91% less population and dry matter, respectively, of all other weeds providing effective weed management.

#### Effect on Crop

All the weed control measures significantly increased the seed and stover yield of pearl millet compared with weedy check (Table 2). Oxyfluorfen at 0.2 kg ha<sup>-1</sup> followed by one hand weeding at 25 DAS recorded significantly higher seed (2408 kg ha<sup>-1</sup>) and stover (5220 kg ha<sup>-1</sup>) yield over all the weed control measures. The next best treatment with respect to grain and stover yield was atrazine at 0.5 kg ha<sup>-1</sup> fb hand weeding at 25 DAS. Manual hand weeding at 25 DAS, intercropping with clusterbean and pre-emergence application of all three herbicides were not found as effective as the pre-emergence application of herbicides fb hand weeding at 25 DAS. Similar findings were also reported by Sharma and Jain (2003). Pooled data showed that significant improvement in yield attributes and highest net return were recorded due to oxyfluorfen at 0.2 kg ha<sup>-1</sup> fb hand weeding at 25 DAS, which was the most profitable for controlling the *T. portulacastrum*

and other weeds in pearl millet.

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