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Weed Dynamics as Influenced by Planting Methods, Mulching and Weed Control in Rainfed Hybrid Pearl Millet (*Pennisetum glaucum* L.)

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Pearl millet [*Pennisetum glaucum* (L.) R. Br. Emend. Stuntz] is usually grown as a dryland dual-purpose grain and fodder crop in semi-arid regions of India and Africa. India is the largest producer (7.7 mt) of pearl millet with an area of 9.7 m ha. It is sown at the onset of rainy season and becomes infested with grassy and broad-leaved weeds, which cause severe competition with the crop resulting in yield reduction upto 60% (Malik *et al.*, 1980). Though inter-cultivation and hand weeding control weeds effectively but chemical control of weeds may be the viable and cost effective alternative in pearl millet. Mulching has suppressing effect on weeds and also conserves moisture (Tiwari *et al.*, 1991). However, the information on the effect of planting methods and mulching on weed dynamics in rainfed hybrid pearl millet var. HHB 67 is meagre. Hence, the present study was conducted with the objective to study the weed dynamics as influenced by planting methods, mulching and weed control in rainfed hybrid pearl millet.

The field experiment was carried out during **kharif** season of 2001 in Research Area of Bajra Section, Department of Plant Breeding, CCS Haryana Agricultural University, Hisar under rainfed condition. The experiment was laid out in split-plot design with two planting methods (regular planting at 45 cm and paired row planting at 30 cm with a skip of 60 cm), three organic mulch treatments (no mulch, mulch at 2 and 4 t ha^{-1}) as main plot treatments and three weed control treatments (weedy check, one hand weeding at 15 DAS and atrazine at 0.5 kg ha^{-1}) as sub-plot treatments. The thinned out pearl millet seedlings were air-dried and then applied as mulch after 21 days of sowing. The treatments were replicated four times. The weed flora in experimental field comprised *Trianthema portulacastrum, Echinochloa crusgalli, Cyperus rotundus, Sorghum halepense, Convolvulus arvensis, Dactyloctenium aegyptium, Cynodon dactylon* and *Bracharia mutica.* The density of *T. portulacastrum* was not affected by planting methods at 30 DAS (Table 1). However, at 50 DAS and at harvest stages the number of this weed recorded under paired row planting was significantly higher compared to normal planting. Mulching at 2 t ha^{-1} did not affect the density of this weed at 30 and 50 DAS. Atrazine remained significantly superior over hand weeding in controlling the weed at all crop stages. Planting methods did not affect the density of *E. crusgalli* at 30 and 50 DAS. Density of this weed was 13.7% higher under paired row plots as compared to normal planting at harvest (Table 1). At 50 DAS, mulch at 4 t ha^{-1} significantly reduced the density of weeds by 15.7% compared to no mulch. Atrazine decreased the density of the weed at 30 DAS and at harvest stages compared to hand weeding and weedy check.

The weed density and dry weight recorded under paired row planting were significantly higher as compared to regular planting at all the stages of crop growth (Table 2). The higher weed density under paired row planting might be due to more space between two rows which resulted in better environment in respect of light and space for germination and growth of weeds. Mulch application at 4 t ha^{-1} decreased the weed density significantly as compared to mulch applied at 2 t ha^{-1}. The reduction in weed density as well as dry matter of weeds under organic mulch treatments could be attributed to its smothering effect on weeds (Kumar *et al.*, 1995). The hand weeding and atrazine application significantly decreased the weed density as compared to weedy check at 30 and 50 DAS and at harvest stage of the crop. The grain and stover yields were significantly higher in paired row planting as compared to regular planting. Mulch application in pearl millet at 2 and 4 t

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Table 1. Effect of planting methods, mulching and weed control on density of weeds (No. m^{-2})

Treatment	*T. portulacastrum*			*E. crusgalli*		
	30 DAS	50 DAS	At harvest	30 DAS	50 DAS	At harvest
Planting methods						
Regular	2.08 (4)	2.57 (6)	2.33 (5)	1.81 (2)	2.31 (5)	2.07 (3)
Paired row	2.01 (3)	3.47 (12)	2.59 (6)	1.87 (3)	2.22 (4)	2.40 (4)
LSD (P=0.05)	NS	0.26	0.19	NS	NS	0.13
Mulching						
No mulch	2.14 (5)	3.28 (12)	2.99 (9)	1.96 (3)	2.42 (5)	2.32 (4)
2 t ha^{-1}	2.12 (4)	3.40 (10)	2.26 (5)	1.86 (3)	2.33 (5)	2.28 (4)
4 t ha^{-1}	1.88 (3)	2.39 (5)	2.13 (4)	1.79 (2)	2.04 (3)	2.19 (3)
LSD (P=0.05)	0.24	0.32	0.23	NS	0.22	NS
Weed control						
Weedy check	2.51 (6)	3.51 (12)	2.98 (9)	2.14 (4)	2.68 (7)	2.55 (4)
Weeding at 15 DAS	2.11 (4)	2.96 (9)	2.43 (5)	1.82 (3)	2.09 (4)	1.94 (3)
Atrazine at 0.5 kg ha^{-1}	1.51 (2)	2.60 (7)	1.97 (3)	1.56 (2)	2.02 (3)	2.21 (3)
LSD (P=0.05)	0.25	0.17	0.17	0.21	0.17	0.18

Figures in parentheses are original values. NS–Not Significant.

Table 2. Effect of planting methods, mulching and weed control on weeds and yield of the crop

Treatment	Weed density (No. m^{-2})			Weed dry matter (g m^{-2})			Yield (kg ha^{-1})	
	30 DAS	50 DAS	At harvest	30 DAS	50 DAS	At harvest	Grain	Stover
Planting methods								
Regular	4.35 (10)	5.97 (36)	5.58 (32)	13.4	60.3	28.9	2743	6808
Paired row	4.87 (24)	7.17 (52)	6.40 (41)	16.6	87.9	36.7	2792	6863
LSD (P=0.05)	0.13	0.14	0.10	0.8	3.2	1.3	39	28
Mulching								
No mulch	5.20 (28)	7.13 (52)	6.72 (46)	19.3	87.8	41.3	2674	6787
Mulch 2 t ha^{-1}	4.54 (21)	6.70 (45)	5.88 (35)	14.5	77.1	31.3	2818	6854
Mulch 4 t ha^{-1}	4.08 (16)	5.89 (35)	5.38 (28)	11.4	59.0	25.9	2810	6867
LSD (P=0.05)	0.15	0.18	0.13	1.0	3.9	1.6	47	28
Weed control								
Weedy check	5.70 (32)	7.75 (60)	7.11 (51)	22.6	102.7	45.6	2578	6681
Weeding at 15 DAS	4.46 (19)	6.24 (39)	5.65 (31)	13.5	65.8	28.3	2853	6915
Atrazine at 0.5 kg ha^{-1}	3.66 (13)	5.73 (35)	5.22 (27)	9.0	55.3	24.7	2901	6911
LSD (P=0.05)	0.17	0.13	0.12	1.0	2.9	1.32	48	33

Figures in parentheses are original values.

ha^{-1} significantly increased the yields as compared to no mulch. The hand weeding and atrazine application increased both grain and stover yields over weedy check. Atrazine was superior and significantly increased grain yield by 48 kg ha^{-1} over hand weeding.

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