E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; SP-7(9): 627-629
Received: 19-06-2024
Accepted: 25-07-2024

Ajay Kumar Meena
M.Sc Scholar, Vivekananda Global University, Jaipur, India, Rajasthan, India

Arjun Lal Prajapat
Assistant Professor, Vivekananda Global University, Jaipur, Rajasthan, India

Corresponding Author:
Ajay Kumar Meena
M.Sc Scholar, Vivekananda Global University, Jaipur, India, Rajasthan, India

Effect of integrated weed management on weed dynamics in pearlmillet (*Pennisetum glaucum* L.)

Ajay Kumar Meena and Arjun Lal Prajapat

DOI: https://doi.org/10.33545/2618060X.2024.v7.i9Si.1560

Abstract
A field experiment was conducted at Research farm, Vivekananda Global University, Jaipur during *kharif*, 2023 on loamy sand soil. The experiment comprises 10 treatments of weed management practices (Weedy check, weed free, One hand weeding at 20 DAS, Two hand weeding at 20 and 40 DAS, Alachlor @ 1.0 kg ha^{-1} (PE), Alachlor @ 1.0 g ha^{-1} (PE) + One hand weeding at 20 DAS, Atrazine @ 500 g ha^{-1} (PE), Atrazine @ 500 g ha^{-1} (PE)+ One hand weeding at 20 DAS, Oxyfluorfen @ 150 g ha^{-1} (PE), Oxyfluorfen @ 150 g ha^{-1} (PE)+ One Hand Weeding at 20 DAS) thereby experiment was laid out in randomized block design and replicated thrice. Results showed that application of after weed free plot, two hand weedings at 20 and 40 DAS treatments resulted significant reduction in weed density, weed dry matter in comparison to most of the treatments while highest weed control efficiency and lowest weed index was recorded with the same treatment.

Keywords: Weed management, pearlmillet, weed dynamics

Introduction
Pearl millet [*Pennisetum glaucum* (L.)R.Br] commonly known as bajra, is a prominent crop of local food system of arid and semiarid regions. It is an important drought hardy coarse grain crop that provides staple food for the poor in a short period. It flourishes satisfactorily and can yield grain under rainfall as low as 200 to 250 mm (Bidinger and Hash, 2003) [1], which makes it one of the most reliable cereal in the rainfed regions of arid and semi-arid tropics. The nutrient content of pearl millet is very well comparable with other cereals and millets. Its grain contains about 11.6% protein, 5% fat, 67% carbohydrate, 2.7% minerals and about 12.4% moisture. It also contains higher amount of carotene, riboflavin (Vit B_2) and niacin (Vit B_4). Traditionally, Bajra chapatti known as Sogra/Hogra is the part of daily diet in the western Rajasthan. Besides it, “Khichadi” and “churma” are the delicious dishes prepared from pearl millet flour. The Crop is also valued as an important source of green and dry fodder (karbi) for cattle in this belt. A small proportion of grains is used for poultry feed. Nowadays, pearl millet grain is also gaining importance as a cheap source of starch for making fine quality breweries (Khairwal, 2003) [5].
Weed control at proper time with suitable methods to get high yield in pearl millet. At present, weeds are controlled by hand weeding twice at 25 and 45 days after sowing and hoeing. However, due to continuous rains during monsoon season it becomes difficult for manual weeding at right time. Furthermore, non-availability of labour and increasing labour charges and being time consuming, it was felt to find out suitable weed control methods involving herbicides. The pre emergence herbicides are effective only for about intial 30 days and thereafter weeds may threat pearl millet crop. Sometimes due to unavoidable circumstances, it is not possible to spray post emergent herbicides and later on it becomes very difficult to control the weeds manually. Under such circumstances, the best possible means to control new flush of weeds are through use of pre emergence herbicides (Singh and Sekhon, 2013) [7]. Weed control during early stages of crop growth period assumes important as revealed from the significant decrease in yield due to delay in weeding. The costly and laborious nature of manual weeding has made chemical weed control popular among farmers. To reduce the cost of finger millet production, intensive applications of weed control methods should be optimized. Therefore, determining appropriate weed management practices is important for production to ensure

optimum grain yield. Identifying the critical period for weed control (CPWC) in crops is one of the first steps in designing a successful integrated weed management.

Weed studies

Weed population per metre square

Weed population was taken at 40 DAS from five random spots in each plot by counting the number of weeds per quadrate of 0.25 m^2 and the average was computed.

Weed Dry matter

Weed samples from five randomly selected spots in each plot were taken at 40 DAS with the help of 0.25m^2 (0.5 m x 0.5 m) quadrate and the average was worked out. The samples so collected were subjected to sundry for sufficient time, weighed and average was computed as dry matter kg/ha.

Weed Control efficiency (WCE)

In order to evaluate the weed management treatments for their efficacy, weed control efficiency of each treatment was computed by using the following formula given by (Umrani and Boi, 1982) [8].

$$WCE\ (\%) = \frac{DMC - DMT}{DMC} \times 100$$

Where,
DMC = Dry matter yield of weeds in weedy check plot
DMT = Dry matter yield of weeds in treated plot

Weed Index (WI)

Weed index is a derived parameter from the crop yields obtained across the treatments of weed control researches (Yadav and Mishra, 1982) [10]. It is a measure of the crop yield loss accrued across treatments in comparison to a weed free plot adopted in an experiment. Following formula was used in calculating weed index.

$$Weed\ Index = \frac{X - Y}{X} \times 100$$

Where,
X = Crop yield in weed free plots
Y = Crop yield in the treated plot

Statistical analysis

In order to test the significance of variation in experimental data obtained for various treatment effects, the data were statistically analyzed as described by Fisher (1950) [3]. The critical differences were calculated to assess the significance of treatment mean wherever the F' test was found significant at 5 per cent level of probability. To elucidate the nature and magnitude of treatment effects, summary tables along with SEm± and CD (P=0.05) were prepared and are given in the text of the chapter. Experimental results and their analyses of variance are given in Appendices at the end.

The following formula were used for standard error, critical difference and coefficient of variance estimations-

a) $SEm\pm = \sqrt{EMS/r}$

b) $C.D. = SEm\pm \times \sqrt{2} \times t\%$

c) $C.V.\ (\%) = \frac{\sqrt{EMS}}{Grand\ mean} \times 100$

Where,
r = Number of replications
t = Number of treatments
D.F. = Degree of freedom
SEm± = Standard error of mean
EMS = Error mean squares
C.D. = Critical difference
C.V. = Coefficient of variance

Results and Discussion

Weed-management practices significantly reduced the weed population and their dry weight as compared to weedy check plot. In case of weed species count and their dry weight, the lowest values were recorded with the application of two hand weeding at 20 and 40 DAS treatment except of weed free plot. However, it was found at par with Atrazine @500 gha^{-1}(PE) + One hand weeding at 20 DAS and Oxyfluorfen at 150 g ha^{-1} (PE) + One hand weeding at 20 DAS. The application of Atrazine @750 gha^{-1}(PE) + one hand weeding at 20 DAS was found effective to control the *Amaranthus viridis* weed. However, application of Oxyfluorfen at 150 g ha^{-1} (PE) + One hand weeding at 20 DAS and Alachlor at 1.0 kg ha^{-1} (PE) + One hand weeding at 20 DAS, also reduced the total weed population and dry weight of weeds as compared to weedy check. The superiority of these treatments could mainly be ascribed to the fact that application of herbicide alone inhibited the germination and emergence of weeds during initial growth stage of crop only but at later stages, these herbicides dissipated and deactivated in the soil and second flush of weeds appeared in such plots. The hand weeding done at 20 and 40 DAS effectively controlled the weeds that emerged at later stage and thus kept the field weed free for a longer duration. Accelerated growth of crop due to looseness of soil and aeration in root zone incurred due to hoeing could be assigned as another reason of lower density and dry matter of weeds obtained under these treatments. These results corroborate the findings of Rao *et al*. (2007) [6] and Changseluk (2003).

There was a great variation in the extent to which the weeds were controlled by different weed management treatments. The maximum weed control efficiency and visual control of 100% at all stages was recorded under weed free treatment. The variation was pronounced more at later stages of growth. At 40 DAS, two hand weeding at 20 and 40 DAS provided the maximum control of weeds in comparison to weedy check (58.12%) and thus found the most superior treatment, followed by Atrazine @500 gha^{-1}(PE) + One hand weeding at 20 DAS and Oxyfluorfen at 150 g ha^{-1} (PE) + One hand weeding at 20 DAS and Alachlor at 1.0 kg ha^{-1} (PE) + One hand weeding at 20 DAS. However at this stage, most of the treatments represented more or less similar weed control efficiencies. Results further revealed that herbicidal treatments without subsequent hand weeding and single hand weeding treatments controlled the weeds less effectively than above mentioned treatments but found significantly superior than weedy check. The weed index was lowest (5.67) in plots two hand weeding at 20 and 40 DAS. The lower weed index values under aforesaid treatments are attributed to the reduced competitional stress by weed. Inhibition of germination of weeds and their growth following application of different herbicides might have reduced the growth of weeds through arresting cell division and elongation and thus causing mortality of weeds. These seem to be the most spectacular reasons of accumulating lesser dry weight of weeds and as a consequently the higher weed control efficiencies. Similar results were also reported by Kaushik and Shaktawat (2005) [4], Walia *et al*. (2007) [9], Rao *et al*. (2007) [6].

Table 1: Effect of integrated weed management on weed population and weed dry matter accumulation

Treatments	Weed population per meter square at 40 DAS	Weed dry matter per meter square at 40 DAS	Weed control efficiency (%)	Weed index
Weedy check	14.68	17.18	0.00	56.06
Weed free	0.00	0.00	100.00	0.00
One Hand Weeding at 20 DAS	7.24	9.74	43.27	28.09
Two Hand Weeding at 20 and 40 DAS	4.70	7.20	58.12	5.67
Alachlor @ 1.0 kg ha^{-1} (PE)	8.91	11.41	33.48	43.86
Alachlor @ 1.0 kg ha^{-1} (PE)+ One Hand Weeding at 20 DAS	6.52	9.02	47.38	25.13
Atrazine @ 500 g ha^{-1} (PE)	8.05	10.55	38.61	33.33
Atrazine @ 500 g ha^{-1} (PE)+ One Hand Weeding at 20 DAS	5.18	7.68	55.34	11.51
Oxyfluorfen @ 150 g ha^{-1} (PE)	6.83	9.33	45.66	38.21
Oxyfluorfen @ 150 g ha^{-1} (PE)+ One Hand Weeding at 20 DAS	5.72	8.22	52.24	20.87
SEm+	0.40	0.51	3.01	4.00
CD (P = 0.05)	1.18	1.51	8.93	11.89

References

1. Bidinger FR, Hash CT. Pearl millet. In: Nguyen, editor. Integration of physiology and molecular biology in plant breeding. New York, USA: Marcel Dekker; c2003. p. 158-162.
2. Changsaluk S. Early post-emergence application to control weeds in sweet corn. In: Proceedings of Annual Conference; Kasetsart University. c2003. p. 532-538.
3. Fisher RA. Statistical methods for research workers. Edinburgh, London: Oliver and Boyd; c1950. p. 57-63.
4. Kaushik MK, Shaktawat MS. Effect of row spacing, nitrogen and weed control on growth, yield and nutrient uptake of sorghum (*Sorghum bicolor*). Indian Journal of Agronomy. 2005;50(2):140-142.
5. Khairwal IS. Coordinator review. All India Coordinated Pearl Millet Project. Agriculture Research Station, Mandor, Jodhpur (Rajasthan); c2003.
6. Rao SS, Regar PL, Jangid BL, Singh YV. Effect of nutrient and weed management on forage sorghum (*Sorghum bicolor*) under rainfed conditions. Indian Journal of Agronomy. 2007;52(3):139-142.
7. Singh HS, Sekhon H. Integrated weed management in pigeonpea (*Cajanus cajan* (L.) Millsp.). World Journal of Agricultural Sciences. 2013;9:86-91.
8. Umrani NK, Boi PG. Studies on weed control in Bajra under dryland conditions. Journal of Maharashtra Agricultural University. 1982;7(2):145-147.
9. Walia US, Singh S, Singh B. Integrated control of hardy weeds in maize (*Zea mays* L.). Indian Journal of Weed Science. 2007;39(1&2):17-20.
10. Yadav JP, Mishra MRC. Naveen Prayogic Krishi: A handbook of agriculture. Etawah: Kanti Prakashan; c1982.