Int.J.Curr.Microbiol.App.Sci (2019) *8*(10): 2629-2633

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 8 Number 10 (2019)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2019.810.303

Effect of Integrated Weed Management on Yield, Yield Attributes and Economics of Pearl Millet [*Pennisetum glaucum* (L.) R. Br. Emend stuntz]

Yalamati Sree Ram Kumar, Rabindra Kumar*, Yasin Abrar Baba and M. Samruthi

Department of Agronomy, Suresh Gyan Vihar University, Jaipu, Rajasthan-302017, India

**Corresponding author*

Keywords

Pearl millet, Alachlor, Atrazine, Oxyfluorfen, Hand weeding

Article Info

Accepted:
28 September 2019
Available Online:
10 October 2019

A B S T R A C T

A field experiment entitled "Effect of integrated Weed management on pearl millet [*Pennisetum glaucum* (L.) R. Br. emend Stuntz]"was conducted at Agricultural farm, Suresh GyanVihar University, Jagatpura, Jaipur, Rajasthan in Kharif 2018. The experiment consisted of nine weed management treatments involving three pre-emergence herbicides (Alachlor, Atrazine and Oxyflourfen) in randomized block design with three replications. Among the treatments, 2 Hand weedings (HW) at 20 and 40 DAS(T_2) attained higher grain, stover and biological yield (1987, 4935 and 6922 kg ha^{-1}) over other treatments. In case of earhead length and harvest index, Atrazine @ 750g ha^{-1}(PE) + 1 HW at 20 DAS (T_6) recorded higher with 8.48g and 28.77% respectively. In case of economics, 2 HW at 20 and 40 DAS (T_2) attained highest gross returns (₹49064 ha^{-1}) and Atrazine @ 750g ha^{-1}(PE) + 1 HW at 20 DAS (T_6) attained higher net returns and BCR with (₹ 23332 ha^{-1}) and (1.91) respectively. Among all the yield attributes i.e. ear head length, test weight, grain yield, stover yield, biological yield and harvest index (20.5, 6.10, 863, 2836, 3698 and 23.33, respectively) attained the lowest values and economics i.e. net returns and BCR (2717 and 1.12, respectively) attained the lowest values.

Introduction

Pearl millet [*Pennisetum glaucum* (L.) R.Br. emend Stuntz] is one of the important cereal crop of arid and semi-arid climatic conditions. Cultivation of pearl millet is mainly confined to the Southern Asia (India, Pakistan, Nepal, Bhutan and Afghanistan) and Africa (Nigeria, Niger, Mali, Tanzania, Sudan and Senegal). India is the largest producer of pearl millet having 7.47 m ha area with annual production of 9.86 million tonnes grain and productivity of 1319 kg ha^{-1}(Anonymous, 2018). As pearl millet is grown predominantly in warm rainy season, weeds of different kinds deprive the crop of vital nutrients, moisture, light and space. Das and Yaduraju (1995) have reported 72% or more yield loss in pearl millet due to its initial slow growth. It picks up growth, start tillering and increase in height after 25-30 days after sowing (DAS) and become more competitive against weeds. Weed management has been always a basic, indispensable integral part of agriculture. Manual weeding is a common practice adopted for weed control throughout the crop season is a labour and

cost-intensive affair. Therefore, integrated approach for weed management using chemical and non chemical methods have been in practice for achieving better management of weeds in field.

Materials and Methods

Experimental details

A field experiment was conducted during kharif, 2018 at Suresh Gyan Vihar University, Agricultural farm, Jagatpura, Jaipur, Rajasthan. The soil was sandy clay loam in texture, low in organic carbon (0.15 %), available N (0.40 kg ha^{-1}), medium in available P (42 kg ha^{-1}) and available K (290 kg ha^{-1}) with pH 8.48. Nine treatments of weed control were evaluated in randomized block design replicated thrice with hybrid RHB- 173. The recommended dose of 60 kg N, 30 kg P_2O_5 and 0 kg K_2O ha^{-1} was applied. Entire quantity of nitrogen and phosphorous were applied as basal dose through urea and single super phosphate, respectively. The seeds were sown with a spacing of 45 × 15 cm. Thinning and gap filling were done at 15 DAS.

Treatment details

The treatments consisted of Control (T_0), 1 HW at 20 DAS (T_1), 2 HW at 20 and 40 DAS (T_2), Alachlor @ 1000 g ha^{-1} (PE) (T_3), Alachlor @ 1000 g ha^{-1} + 1 HW at 20 DAS (T_4),Atrazine @ 750 g ha^{-1} (PE) (T_5), Atrazine @ 750 g ha^{-1} + 1 HW at 20 DAS (T_6), Oxyfluorfen @ 150 g ha^{-1} (PE) (T_7) and Oxyfluorfen @ 150 g ha^{-1} + 1 HW at 20 DAS (T_8). Pre-emergence herbicides were applied 1 day after sowing (DAS), uniformly by using spray fluid @ 800 L ha^{-1} with the help of knapsack sprayer. Hand weedings were carried out in the respective treatments at 20 and 40 DAS.

Statistical analysis

The observations on yield and yield attributes were recorded at harvest. The statistical analyses were done by using OP STAT.

Results and Discussion

Weed flora

Weed survey during the experimentation showed that the crop was heavily infested by weeds immediately after the emergence of the crop. The prominent annual dicot weed species noted to invade the crop were *Digera arvensis*, *Amaranthus viridis*, *Amaranthus spinosus*, *Phyllanthus niruri*, *Trianthema portulacastrum* etc. Whereas, *Cyperus rotundus*, *Dactyloctenium aegypticum*, *Digitaria sanguanalis*, *Cenchrus biflorus* and *Cynodon dactylon* were the major grassy and sedge species found to invade the crop.

Yield and yield attributes

Yield attributes showed a varied difference among the parameters. 2 HW at 20 and 40 DAS(T_2) recorded the highest yield attributes i.e. grain, stover, biological yield and test weight of pearl millet, which were statistically similar to pre-emergence application of atrazine @ 750 g ha^{-1}(PE) + 1 HW at 20 DAS(T_6). Other parameters i.e.Length of earhead and harvest index recorded highest in (T_6) atrazine @ 750 g ha^{-1}(PE) + 1 HW at 20 DAS, which was statistically similar to 2 HW at 20 and 40 DAS (T_2). The treatments associated with pre-emergence application of oxyfluorfen @ 150 g ha^{-1} resulted in reduced yield attributes and yield in pearl

Economics

The treatment (T_2) HW twice at 20 and 40 DAS resulted in the highest gross returns, which was in parity with treatment (T_6)

atrazine @ 750 g ha^{-1}(PE) + 1 HW at 20 DAS. However, the treatment T_6 recorded the highest net returns and benefit-cost ratio (Table 2). The treatment with alachlor @ 1000 g ha^{-1}(PE) and alachlor @ 1000 g ha^{-1}(PE) + 1 HW at 20 DAS recorded lesser gross, net returns and benefit-cost ratio due to lower yield level and higher cost of cultivation. The lowest gross, net returns and benefit-cost ratio were observed in control (T_0) due to the uncontrolled growth of weeds which resulted in lowest yield associated with it.

Table.1 Effect of integrated weed management practices on yield and yield attributes of pearl millet at harvest

Treatments	Earhead length (cm)	Test weight (gm)	Grain yield (kg ha^{-1})	Stover yield (kg ha^{-1})	Biological yield (kg ha^{-1})	Harvest index
T_0- Control	20.5	6.10	863	2,836	3,698	23.33
T_1-1 HW at 20 DAS	29.2	7.93	1,526	3,856	5,378	28.37
T_2-2 HW at 20 and 40 DAS	31.0	8.43	1,987	4,935	6,922	28.70
T_3-Alachlor @ 1000 g ha^{-1} (PE)	25.9	7.16	1,036	3,212	4,248	24.38
T_4-Alachlor @ 1000 g ha^{-1} (PE)+ 1 HW at 20 DAS	26.4	7.36	1,339	3,516	4,855	27.57
T_5- Atrazine @ 750 g ha^{-1} (PE)	28.6	8.26	1,641	4,325	5,966	27.50
T_6- Atrazine @ 750 g ha^{-1} (PE)+ 1 HW at 20 DAS	32.4	8.36	1,976	4,898	6,874	28.77
T_7-Oxyfluorfen @ 150 g ha^{-1} (PE)	23.5	7.40	1,156	3,189	4,344	26.60
T_8-Oxyfluorfen @ 150 g ha^{-1} (PE)+ 1 HW at 20 DAS	24.6	7.13	1,456	3,456	4,911	29.63
SE(m)±	1.1	0.47	70	165	240	1.14
CD at 5%	3.4	NS	212	501	726	NS

Table.2 Effect of integrated weed management practices on economics of pearl millet

Treatments	Yield (kg ha^{-1})		Return		Gross returns	Net returns	BCR
	Grain	Stover	Grain	Stover			
T_0-Control	863	2836	13808	9926	23734	2717	1.12
T_1-1 HW at 20 DAS	1526	3856	24416	13496	37912	13520	1.55
T_2-2 HW at 20 and 40 DAS	1987	4935	31792	17272	49064	21297	1.76
T_3-Alachlor @ 1000 g ha^{-1} (PE)	1036	3212	16576	11242	27818	5026	1.22
T_4-Alachlor @ 1000 g ha^{-1} (PE) + 1 HW at 20 DAS	1339	3516	21424	12306	33730	7563	1.28
T_5-Atrazine @ 750 g ha^{-1} (PE)	1641	4325	26256	15137	41393	19341	1.87
T_6-Atrazine @ 750 g ha^{-1} (PE) + 1 HW at 20 DAS	1976	4898	31616	17143	48759	23332	1.91
T_7-Oxyfluorfen @ 150 g ha^{-1} (PE)	1156	3189	18496	11161	29657	7785	1.35
T_8-Oxyfluorfen @ 150 g ha^{-1} (PE) + 1 HW at 20 DAS	1456	3456	23296	12096	35392	10145	1.40

It is clear from the results that all the IWM treatments evaluated in present study varied widely in their effect on yield attributing characters like length of ear head, test weight, grain, stover and biological yields were found significantly superior in comparison to control treatment. The maximum test weight (8.43 g) was recorded under the treatment T_2 (2 HW at 20 and 40 DAS). This result might be due to the fact that increased uptake of nutrients due to weed free environment and as a result there was more growth and development and thereby resulted in higher test weight (Singh *et al.* 2001). The highest ear head length was observed under Atrazine @ 750 g ha^{-1} (PE) + 1 HW at 20 DAS (T_6). Two HW at 20 and 40 DAS (T_2) recorded grain and stover yield (1,339 and 3,516 kg ha^{-1}, respectively) kept the crop almost weed free environment which in turn resulted in significant reduction in competition for nutrients and other growth resources by weeds (Vanaja. 2007), Srividhya *et al*. (2011), Sandhyarani and Karunasagar (2013) and Sunitha *et al*. (2011). Furthermore, the most severe competition throughout the crop season due to unrestricted weed growth under Control (T_0) plots increased the depletion and moisture by weeds, thus adversely affecting the crop growth and ultimately resulted in the lowest yield of crop (Kaur and Singh. 2006), Kiroriwal *et al.* (2012) and Munde *et al.* (2013) in pearl millet.

All the integrated weed control treatments provided significantly higher net returns and B: C ratio in comparison to control. Atrazine @ 750 g ha^{-1} (PE) + 1 HW at 20 DAS (T_6) treatment fetched the maximum net returns (₹ 23332 ha^{-1}) with a BCR of 1.91. The higher net returns under superior treatment was the result of higher grain and stover yield due to effective control of weeds. The lowest grain yield achieved under control (T_0) treatment was eventually reflected in the lowest net returns (₹ 2717 ha^{-1}) and B: C ratio (1.12). Results of the present investigation corroborate with the findings of Arvadiya *et al.* (2012), Mathukia *et al*. (2015) and Mishra *et al.* (2017) in pearl millet.

References

Anonymous, (2018).Indian Economy Survey, Area, Production and Yield of major crops. Govt of India, Ministry of finance, economic division, New Delhi.

Arvadiya, L. K., Raj, V. C., Patel, T. U. and Arvadiya, M. K. (2012). Influences of plant population and weed management on weed flora and productivity of sweet corn (*Zea mays*). *Indian Journal of Agronomy*, 57(2): 162-167.

Das, T. K. and Yaduraju, N.T. (1995).Crop weed competition studies in some kharif crops: 11, nutrient uptake and yield reduction. *Annals of Plant Protection Science*, 3(2): 95-99.

Kaur, A. and Singh, V.P. (2006). Weed dynamics as influenced by planting methods, mulching and weed control in rainfed hybrid pearl millet (*Pennisetum glaucum*). *Indian Journal of WeedScience*, 38(1&2): 135-136.

Kiroriwal, A., Yadav, R.S. and Kumawat, A. (2012). Weed management in pearl millet based intercropping system. *Indian Journal of Weed Science*, 44(3): 200–203.

Mathukia, R.K., Mathukia, P.R. and Polara, A.M. (2015). Intercropping and weed management in pearl millet (*Pennisetum glaucum*) under rainfed condition. *Agriculture ScienceDigest*, 35(2): 138-141.

Mishra, P. S., Ramu Reddi, Y., Subramanyam, D. and Umamahesh, V.(2017).Impact of integrated weed management practices on weed dynamics, growth and yield of Pearl millet [*Pennisetum glaucum*(L). R. Br. Emend Stuntz] of *International journal*

of Agriculture sciences, 9(3): 3677-3678.

Munde, S.D., Patel, J.C., Ali, S. and Aghav, V.D. (2013). Weed control study in *kharif* pearl millet (*Pennisetum glaucum*). *Bioinfolet*, 10(2A): 464-468.

Sandhyarani, B. and Karunasagar, G. (2013). Effect of integrated weed management on growth, yield and economics of sweet corn.*Agriculture Science Digest*. 33(1): 52-55.

Singh, R. K., Chauhan, S. P. S. and Singh, S. (2001). Integrated weed management in pearl millet (*Pennisetum typhoides*). *Indian Journal of Weed Science*,33(3&4): 206-208.

Srividhya, S., Chandrasekhar, K. and Veeraraghavaiah.(2011). Effect of tillage and herbicide use on weed management in maize (*Zea mays* L.). *Andhra Agriculture Journal*, 58(2): 123-125.

Sunitha, N., Maheswara Reddy, P. and Reddy, D. S. (2011). Influence of planting pattern and weed control practices on weed growth, nutritive uptake and productivity of sweet corn. *CropResearch*.41(1,2&3): 13-20.

Vanaja, C. H. (2007). Weed management studies in *kharif* maize. M. Sc. (Agriculture) Thesis submitted to Acharya N. G. Ranga Agricultural University Rajendranagar, Hyderabad.

How to cite this article:

Yalamati Sree Ram Kumar, Rabindra Kumar, Yasin Abrar Baba and Samruthi, M. 2019. Effect of Integrated Weed Management on Yield, Yield Attributes and Economics of Pearl Millet [*Pennisetum glaucum* (L.) R. Br. Emend stuntz]. *Int.J.Curr.Microbiol.App.Sci.* 8(10): 2629-2633. doi: https://doi.org/10.20546/ijcmas.2019.810.303