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Effect of pre and post emergence herbicides application on growth and yield of Pearl millet (*Pennisetum glaucum* L.)

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Abstract
An experiment entitled "Weed management in hybrid pearl millet (Adishakti) under rainfed condition" was conducted during *kharif* 2020 at Post Graduate Research Farm, Agronomy Section, College of Agriculture, Dhule. Experiment consisted of nine treatments laid out in randomized block design with three replications. Among the chemical weed management treatments, application of pendimethalin @ 750 g ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_9) recorded significantly higher all growth parameters and it was found at par with application of pendimethalin @ 750 g ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_8). The significant effect on growth character of plant was noticed due to different treatments which resulted in enhance yield contributing characters *viz.*, earhead length plant^{-1} (cm), earhead girth plant^{-1} (cm), weight of earhead plant^{-1} (g), grain weight earhead^{-1} (g) and test weight (g). Among the different herbicidal treatments, grain and straw yield was observed better with application of pendimethalin @ 750 g ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_9) (2718.73 and 5099.12 kg ha^{-1}, respectively) and it was found at par with application of pendimethalin @ 750 g ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_8) (2548.76 and 4974.99 kg ha^{-1}, respectively).

Keywords: Pearl millet, pre emergence, post emergence and herbicide

Introduction
Heavy weed infestation is one of the major constraints that limit the productivity of pearl millet crop. Weeds emerge fast and grow rapidly competing with the crop severally for growth resources *viz.*, nutrients, moisture, sunlight and space during entire vegetative and early reproductive stages of pearl millet. The critical period for weed competition in pearl millet is up to 30-45 days after sowing (Bhan *et al.* 1998) [2]. Weeds cause lower grain and stover yield of pearl millet. On an average, 55% yield reduction due to heavy weed infestation in pearl millet crop was observed by Banga *et al.* (2000) [1] while, Kumar and Shaik (1993) [6] reported 43.4%. Weeds emerge along with the crop causing serious competition during the initial growth period resulting in seed yield loss up to 40% or more (Sharma and Jain, 2003) [8]. Hence, managing weeds during this period is most critical for obtaining higher yields.
Almost all types of weeds *viz.*, grassy, broad leaved weeds and sedges infested the pearl millet field. Some predominant weed species are *Cynodon dactylon, Dinebra retroflexa, Echinochloa colona, Brachiaria eruciformis, Cyperus rotundus, Parthenium hysterophorus, Commelina benghalensis, Amaranthus viridis* and *Trianthema portulacastrum* which cause heavy losses in pearl millet production. Atrazine and pendimethalin recommended as a pre emergence herbicide is not effective against some of the weeds both grassy and non-grassy as well the sedges *Cyperus rotundus.* Hence there is a need for some alternate post emergence herbicides which can be provide broad spectrum weed control in *kharif* pearl milet without affecting the crop growth and yield of crop. Use of herbicides would make weed control more acceptable to the farmers and control of weeds by using herbicides was a cheaper proposition than with manual methods. Keeping this fact in view, the present investigation was undertaken to study "Weed management in hybrid pearl millet (Adishakti) under rainfed condition" during *kharif* 2020 at Post Graduate Research Farm, Department of Agronomy, College of Agriculture, Dhule.

Material and Methods
The field experiment was conducted at the Post Graduate Research Farm, Department of

Agronomy, College of Agriculture, Dhule during the *kharif* season of year 2020. Climatologically, this area falls in the sub-tropical region at the North. Generally monsoon commences by third week of June and retreats at the end of September with the average annual rainfall of 607 mm. Experiment consisted of nine treatments laid out in randomized block design with three replications. The treatments consist with weedy check (T_1), weed free (T_2), atrazine @ 0.50 kg ha^{-1} PoE (T_3), 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_4), 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_5), atrazine @ 0.5 kg ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_6), atrazine @ 0.5 kg ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_7), pendimethalin 750 g ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_8), pendimethalin 750 g ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_9). The seed of pearl millet variety DHBH 9071 (Adishakti) was sown on 1st July 2020 at spacing of 45 x 15 cm^2 using seed rate 3-4 kg ha^{-1}. The fertilizer was applied as per the recommended dose to pearl millet crop as 60:30:30 kg NPK ha^{-1}. The crop was grown with recommended package of practices and was harvested at maturity on 5th October 2020.

Results and Discussion

Effect of weed management treatments on growth parameters

Growth characters *viz.*, plant height, number of leaves plant^{-1}, leaf area plant^{-1}, number of tillers plant^{-1}, number of effective tillers plant^{-1}, dry matter plant^{-1} were influenced significantly by different weed management treatments. The plant height (cm), number of leaves plant^{-1}, leaf area plant^{-1} (dm^2), number of tillers plant^{-1}, number of effective tillers plant^{-1}, dry matter plant^{-1} (g) were observed significantly more under weed free (T_2) treatment than those in registered in rest of weed control treatments in study, while it was recorded lower in weedy check (T_1) treatment. In respect of growth characters, application of pendimethalin @ 750 g ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_9) was in the second order and significantly superior over other chemical weed management treatments but it was at par with pendimethalin @ 750 g ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_8). Among the different herbicidal treatments, sequential spraying of pre and post-emergence herbicides recorded significantly more plant height, number of leaves plant^{-1}, leaf area plant^{-1}, number of tillers plant^{-1}, number of effective tillers plant^{-1}, dry matter plant^{-1} than only post-emergence application of herbicide treatments due to better utilization of resources as well as effective control of weeds. The results are in accordance with those reported by Channabasavanna *et al.* (2015) [3], Kamble *et al.* (2015) [5], Dobariya *et al.* (2014) [4] and Kumar and Chawla (2019) [7].

Effect of weed management treatments on yield attributes and yield: The important yield contributing characters like earhead length plant^{-1} (cm), earhead girth plant^{-1} (cm), weight of earhead plant^{-1} (g), grain weight earhead^{-1} (g) and test weight (g) were significantly more under weed free (T_2) treatment. Among the different herbicidal treatments, application of pendimethalin @ 750 g ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_9) was significantly superior over other chemical weed management treatments but it was at par with pendimethalin @ 750 g ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_8). The grain and straw yield (kg ha^{-1}) of pearl millet was found to be significantly higher (2896.92 and 5316.87 kg ha-^{1}, respectively) in treatment of weed free (T_2). Among the different chemical treatments, spraying of pendimethalin @ 750 g ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_9) which recorded significantly maximum grain and straw yield (2718.73 and 5099.12 kg ha^{-1}) as compared to other treatments of weed control and it was found at par with application of pendimethalin @ 750 g ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE (T_8) (2548.76 and 4974.99 kg ha^{-1}). Among the herbicidal treatments tried in the experiment, application of pre-emergence herbicide followed by post emergence herbicide treatment was found significantly better than application of post-emergence herbicide only in respect of grain and straw yield of pearl millet may probably be due to better weed management resulting in improvement in all growth and sink parameters which contributed higher yield owing to favourable condition in absorbing soil moisture, nutrient content and sunlight penetration during crop growing period. The grain and straw yield was significantly lowest under weedy check (T_1) treatment. These results correlate with the findings of Dobariya *et al.* (2014) [4], Kamble *et al.* (2015) [5] and Kumar and Chawla (2019) [7].

Table 1: Plant height (cm), number of leaves plant^{-1}, leaf area plant^{-1} (dm^2), number of tillers plant^{-1}, number of effective tillers plant^{-1} and dry matter plant^{-1} (g) as influenced by different herbicidal treatments

Treatments	Plant height (cm)	Number of leaves plant^{-1}	Leaf area plant^{-1} (dm^2)	Number of tillers plant^{-1}	Number Of effective tillers plant^{-1}	Dry matter plant^{-1} (g)
T_1 Weedy check	153.14	4.5	1.01	1.6	1.1	70.66
T_2 Weed free	200.52	9.2	7.78	3.5	3.3	117.16
T_3 Atrazine @ 0.50 kg ha^{-1} PoE	165.04	5.4	2.01	2.18	1.6	81.02
T_4 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	170.16	5.7	2.56	2.3	1.8	85.56
T_5 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	172.26	5.9	2.77	2.4	2.0	89.23
T_6 Atrazine @ 0.5 kg ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	183.27	6.8	4.22	2.7	2.5	100.54
T_7 Atrazine @ 0.5 kg ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	185.34	7	4.85	2.8	2.6	103.18
T_8 Pendimethalin 750 g ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	195.23	8.2	7.10	3.3	3.1	113.73
T_9 Pendimethalin 750 g ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	197.45	8.5	7.59	3.4	3.2	115.33
S.E.(m) +	2.71	0.24	0.26	0.09	0.14	3.00
C.D. at 5%	8.14	0.73	0.77	0.26	0.42	9.00
General mean	180.27	6.80	4.43	2.69	2.36	97.38

Table 2: Weight of earhead plant^{-1} (g), grain weight earhead^{-1} (g) and test weight (g), grain yield (kg ha^{-1}) and straw yield (kg ha^{-1}) as influenced by different treatments

Treatment Details	Weight of earhead plant^{-1} (g)	Grain weight earhead^{-1} (g)	Test weight (g)	Grain yield (kg ha-1)	Straw yield (kg ha-1)
T_1 Weedy check	45.13	30.45	7.21	1180.35	2709.34
T_2 Weed free	69.12	52.27	12.87	2896.92	5316.87
T_3 Atrazine @ 0.50 kg ha^{-1} PoE	54.67	43.78	8.70	1805.65	3911.23
T_4 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	56.08	44.07	9.08	1834.29	3968.53
T_5 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	57.16	44.21	9.31	1982.61	4165.23
T_6 Atrazine @ 0.5 kg ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	60.12	47.14	10.71	2205.05	4610.53
T_7 Atrazine @ 0.5 kg ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	63.26	48.26	10.81	2356.02	4630.78
T_8 Pendimethalin 750 g ha^{-1} PE *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25–30 DAS PoE	66.61	50.74	12.20	2548.76	4974.99
T_9 Pendimethalin 750 g ha^{-1} PE *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS PoE	68.89	51.84	12.25	2718.73	5099.12
S.E.(m) +	0.92	0.55	0.45	63.64	114.35
C.D. at 5%	2.76	1.66	1.35	190.80	342.84
General mean	60.12	45.86	10.35	2169.819	4376.291

Conclusion

Incessant rains do not permit timely inter- cultivations and manual control of weeds is also difficult on large scale on account of high cost and labor shortage during peak period of weeding. The only alternative that needs to be explored is the sequential application of herbicides pendimethalin @ 750 g ha^{-1} *fb* 2,4-D (Na Salt) @ 0.5 kg ha^{-1} at 25-30 DAS (T_9) and pendimethalin @ 750 g ha^{-1} *fb* 2,4-D (Dimethyl amine) @ 0.5 kg ha^{-1} at 25-30 DAS (T_8) (*i.e.* PRE followed by POST) wiil provide more consistent weed control than application of post-emergence herbicides only, which had kept the weeds in control which results in better
growth at all growth stages and producing maximum yield of pearl millet crop.

References

1. Banga RS, Yadav A, Malik RK, Pahwa SK, Malik RS. Evaluation of tank mixture of acetachlor and atrazine or 2,4-D Na against weeds in pearl millet. Indian J of Weed Sci 2000;32(3, 4):194-198.
2. Bhan VM, Singh VP, Kumar S, Dixit A. Weed management in Fifty years of Agronomic Research in India. Ed. By Yadav *et al.* Indian Society of Agronomy, New Delhi 1998, 164.
3. Channabasavanna AS, Shrinivas CS, Rajakumar H, Kitturmath MS. Efficiency of tank mix application of atrazine 50 WP. Karnataka J Agric. Sci 2015;28(3):(327-330).
4. Dobariya VK, Mathukia RK, Gohil BS, Chhodavadia SK. Integrated weed management in sweet corn. Indian J. Weed Sci 2014;46(2):195-196.
5. Kamble AS, Yogeesh LN, Prashanth SM, Channabasavanna AS, Channagoudar RF. Effect of weed management practices on weed growth and yield of maize. Int. J. Sci. Environ 2015;4(6):1540-1545.
6. Kumar BV, Shaik Mohammad. Efficacy of herbicide spray as an alternative to manual weeding in pearl millet (*Pennisetum glaucum*). Indian Journal of Agronomy 1993;38(2):218-222.
7. Kumar M, Chawla J. Comparative study on weed control efficacy of different pre-and post-emergence herbicides in *kharif* maize. Indian J Weed Sci. 2019;51(1):32-35.
8. Sharma OL, Jain NK. Integrated weed management in pearl millet. Indian J of Weed Sci 2003;35(1, 2):134-135.