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Effect of herbicidal weed management practices on growth characters of finger millet (*Eleusine coracana* L.)

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Abstract
An experiment was conducted during *kharif* - 2023 to study the effect of herbicidal weed management practices on finger millet. Results revealed that the crop growth parameters *viz*; plant height (72.02 cm), number of tillers (123.33 m^{-2}), chlorophyll content (33.95 SPAD value) and dry matter accumulation (312.01 g m^{-2}) at 90 DAS were significantly higher in weed free (T_2) treatment. Among the herbicidal weed management significantly higher crop growth parameters were recorded under pre-emergence application (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 ml a.i. ha^{-1} (PoE) and pre-emergence application (T_{11}) Pendimethalin 30% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE).

Keywords: Herbicidal weed management, growth characters, finger millet, *Eleusine coracana* L.

Introduction
Millets which are small yet are majestic for humans, soil and sustainability, finger millet (*Eleusine coracana* L.) is among them. Finger millet as the name say have finger like panicles which can be conceived as a hand giving blessing of healthy body and mind to us. It belongs to the family *Poaceae* with chromosome number 2n=3 and originated in Africa. It was introduced in India around 3000 years ago and with its ever growing cultivation in the country after millennials, India has now become a secondary centre of diversity for finger millet (FAO, 2021). It is the fourth most important millet in the world after sorghum, pearl millet and foxtail millet (Gupta *et al*., 2012) [5]. It is primarily a subsistence staple cereal food for millions of people in dry lands of East and Central Africa and Southern India (Holt, 2000; Mgonja, 2005) [6, 10]. The major producers of finger millet are India, Nigeria, Niger, Mali, Burkina Faso, Chad and China (Chandra *et al.*, 2016) [2].

In India, finger millet is cultivated under an area of 11.59 million hectares with the production of 19.98 million tonnes and average yields of 1724 Kg ha^{-1}. The major finger millet growing states of India are Karnataka, Tamil Nadu, Uttarakhand, Maharashtra, Andhra Pradesh, Odisha, Jharkhand, Gujarat, West Bengal and Bihar (APEDA, 2020-21). In Himachal Pradesh, the area and production of finger millet was 1756 hectares, 2060 metric tonnes, respectively with the major producing districts are Shimla, Kangra, Sirmaur and Solan. Further, in Solan District, the area and production of finger millet is 14 hectares and 10 metric tonnes, respectively (Statistical Abstract of Himachal Pradesh, 2022) [13].

Finger millet can be grown even in poor soil but its production and productivity is very low because of inefficient nutrient management, heavy weed infestation, incidence of blast disease etc. Among these, weed infestation is the most problematic factor resulting in drastic reduction in yield up to 20 to 50% (Kushwaha *et al.*, 2002) [9]. The critical period of crop-weed competition is five weeks after sowing/planting. Since finger millet is a high statue crop with slower initial growth, weeds infestation at early stages oppress it's growth. Usually farmers are managing weeds through hand weeding but it has become the most expensive operation due to unavailability of labour and high cost. According to Nyende, 2000 [11] hand weeding requires 25% of total production labours only for weeding. Therefore, chemical herbicides can be used as alternate to hand weeding which not only reduces cost of cultivation by replacing hand weeding but also efficiently and timely manage of weeds (Degu *et al.*, 2009) [3]. Herbicides can either be applied as pre- emergence (herbicides that are applied prior to weed seedling emergence) or

post- emergence herbicides (applied after weeds have emerged above the ground).

Therefore, in view of the above considerations the present investigation titled "Effect of Herbicidal Weed Management Practices on Weed Dynamics and Yield of Finger Millet (*Eleusine coracana* L.)" was conducted at Chamelti Agriculture Farm, MS Swaminathan School of Agriculture, Solan, Himachal Pradesh.

Materials and Methods

The experiment was conducted during *kharif* - 2023 at Chamelti Agriculture Farm, MS Swaminathan School of Agriculture, Shoolini University of Biotechnology and Management Sciences, Solan (H.P.) which is situated 30 km away from Solan city at an elevation of 1,270 meters above mean sea level lying between latitude 300 85'67.30 N and longitude 770 13'20.38 E, it falls under the mid-hill zone of Himachal Pradesh. This region falls under moist sub humid zone of Himachal Pradesh. The average annual rainfall is 1262 mm and is mostly received during the month of July to September. The soil of the experimental site was sandy loan with pH of 6.95, OC (0.88%), Available N 292.78 kg ha^{-1}, available P 24.59 kg ha^{-1} and available K 214.34 kg ha^{-1}. The field experiment was laid out in Randomized Block Design comprising thirteen treatments and replicate thrice. The experiment consists (T_1) Weedy check, (T_2) Weed free, (T_3) Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE), (T_4) Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE), (T_5) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE), (T_6) 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE), (T_7) Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE), (T_8) Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE), (T_9) Oxyfluorfen 23.5% EC @0.075 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @25 mL a.i. ha^{-1} (PoE), (T_{10}) Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE), (T_{11}) Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE), (T_{12}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE) and (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE). The spraying treatment were imposed as pre-emergence on third day after sowing and post-emergence on 25th day after sowing. A high volume spray using knapsack sprayer fitted with flat fan nozzle was used for spraying and the spray fluid was used @ 600 L ha^{-1}. In the hand weeding treatment weeds were uprooted when they appeared in Weed Free treatment. The observations on crop growth characters *viz;* plant height, number of tillers, chlorophyll content, dry matter accumulation, crop growth rate were recorded at 30, 60, 90 DAS and at harvest.

Results and Discussion

Weed Flora: The major weed flora observed were *Commelina banghalensis*, *Ageratum conyzoides*, *Galinsoga parviflora*, *Oxalis corniculata* among broad leaved, *Cyperus rotundus*, *Cyperus iria* among sedges and *Digitaria sangunalis*, *Eleusine indica*, *Setaria viridis* and *Echinochloa colona* among grasses in the field experimental area.

Effect on Crop growth parameters

Effect on Plant height (cm): Significantly higher plant height was noticed under Weed Free (T_2) treatment in all the periodic intervals. Among the herbicidal weed management practices, significantly higher plant height (32.95 cm) was recorded under pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) which was statistically at par with pre-emergence application of (T_9) Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) and pre-emergence application of (T_{11}) Pendimethalin 30% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) at 30 DAS. However, the significantly lower plant height (19.65 cm at 30 DAS) was recorded under Weedy Check (T_1) treatment during the course of study. Similar trend was also noted at 60, 90 DAS and at harvest stage.

Effect on Chlorophyll content (SPAD value): At periodic intervals the significantly higher chlorophyll content (29.71, 49.77 and 33.95 at 30, 60 and 90 DAS, respectively) was noticed under Weed Free (T_2) treatment. Among the herbicidal weed management practices, chlorophyll content (28.58, 42.11 and 32.33 at 30, 60 and 90 DAS, respectively) were recorded under pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE). At 30 DAS, chlorophyll content under pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) was statistically at par with pre-emergence application of (T_{11}) Pendimethalin 30% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) followed by pre-emergence application of (T_9) Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE) *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE), post-emergence application of (T_7) Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1}, pre-emergence application of (T_{12}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE) and pre-emergence application of (T_{10}) Pendimethalin 30% EC @ 1 L a.i. ha^{-1} *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE). However, at 60 DAS, pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) was statistically at par with pre-emergence application of (T_{11}) Pendimethalin 30% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE). While, significantly lower chlorophyll content (22.29) was recorded under Weedy Check (T_1) treatment at 30 DAS. Similar results were also found at 60 and 90 DAS.

Effect on number of tillers (m^{-2}): At 60, 90 DAS and at harvest stage, significantly higher number of tillers (121.33, 123.33 and 106 m^2 at 60, 90 DAS and at harvest, respectively) were noticed under Weed Free (T_2) treatment. Whereas, in herbicidal weed management practices, significantly higher number of tillers (120.67, 122 and 103.67 m^{-2} at 60, 90 DAS and at harvest, respectively) were noticed under pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE). In case of 90 DAS and at harvest, pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) was on par with all the treatments except pre-emergence application of (T_3) Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} and pre-emergence application of (T_4) Pendimethalin 30% EC @ 1 L a.i. ha^{-1}. However, at 60 DAS, pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) was statistically at par with all the treatments except pre-emergence application of (T_3) Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1}, pre-emergence application of (T_4) Pendimethalin 30% EC @ 1 L a.i. ha^{-1}, (T_5) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) and post-emergence of 2, 4-D 58% SL @ 0.5 L a.i. ha^{-1}. While, significantly lower number of tillers (98.67, 101.33 and 84.67 m^{-2} at 60, 90 DAS and at harvest, respectively) was recorded under Weedy Check

(T_1) treatment at periodic intervals during the course of experimentation.

Effect on dry weight accumulation (g m^{-2}): The significantly higher dry weight accumulation (29.77, 102.55, 312.01 and 398.12 g m^{-2} at 30, 60, 90 DAS and at harvest, respectively) was noticed under Weed Free (T_2) treatment. Among the herbicidal weed management practices, significantly higher dry weight accumulation (25.47, 96.90, 300.48 and 385.90 g m^{-2} at 30, 60, 90 DAS and at harvest, respectively) were recorded under pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE). At 30 DAS, the dry weight accumulation under pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) was statistically at par with pre-emergence application of (T_{11}) Pendimethalin 30% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) followed by pre-emergence application of (T_9) Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE) *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE), post-emergence application of (T_7) Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} and pre-emergence application of (T_{12}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE). Almost similar results were also recorded at 90 DAS. However, at harvest emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) was statistically at par with pre-emergence application of (T_{11}) Pendimethalin 30% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE). While, significantly lesser dry weight accumulation (13.16 g m^{-2}) was recorded under Weedy Check (T_1) treatment at 30 DAS. Similar trend was also followed at 60, 90 DAS and at harvest during course of study.

Effect on crop growth rate (g m^{-2} day^{-1}): Significantly higher crop growth rate (2.43, 6.98 and 6.15 g m^{-2} day^{-1} at 30-60, 60-90 DAS and 90 DAS-at harvest, respectively) was noticed under Weed Free (T_2) treatment during experimentation. Among the herbicidal weed management practices, the crop growth rate (2.38, 6.79 and 6.10 g m^{-2} day^{-1} at 30-60, 60-90 and 90 DAS- at harvest, respectively) were recorded under pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE). However, at 60 DAS, pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) was statistically at par with all the treatments except for pre-emergence application of (T_3) Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1}. While, significantly lower crop growth rate (1.58, 4.16 and 1.39 g m^{-2} day^{-1} at 30-6-, 60-90 and 90 DAS-at harvest, respectively) was recorded under Weedy Check (T_1) treatment during course of study.

Discussion

At the majority of all the growth phases, herbicidal weed management practices had a substantial impact on all of the growth parameters over the weedy check. Significantly higher growth characters were observed under Weed Free (T_2) treatment over the rest of the treatments. Among herbicidal weed management practices significantly highest growth parameters were observed under pre-emergence application of (T_{13}) Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE) at all the stages of crop growth. The feasible reason for maximum plant height and number of tillers might be due to better control of weed associated with crop which provide more space and Bispyribac sodium hamper plant height but at same time provide ample of opportunity for crop to use resources to produce maximum number of tillers as compare to weedy check plot. Similar finding was reported by Kumar *et al.* (2015) [8]; Pandey *et al.* (2018) [14]; Satish *et al.* (2018) [12]; Ashrafi *et al.* in 2020 [1].

The maximum chlorophyll content was also the reason of better control of weeds by herbicidal weed management which provide sufficient of nutrient, moisture and space for foliage growth. Dry matter accumulation is vital parameter of crop which determines the yield of crop. Dry matter accumulation is vital parameter of crop which determines the yield of crop. Amount of dry matter production depend upon rate of photosynthesis and amount of photosynthesis used in respiration. Higher the rate of photosynthesis and lesser amount of photosynthates used in respiration results more amount of dry matter accumulation. Dry matter accumulation increased with progress of stages of crop up to harvest. Crop growth rate refered by dry matter accumulation, it indicates the rate at which the crop is growing and it was maximum during initial stages of crop which slowed down as crop advanced towards maturity. According to Ashrafi *et al.* in 2020 [1], the possible reason of above results might be due to better weed control and congenial environment for maximum utilization of resources like sunlight, nutrients, moisture which helped plant for vigorous growth and same trend also reported by him. Similar observation was noticed by Satish *et al.* (2018) [12] and Kumar *et al.* (2015) [8].

Table 1: Plant height (cm) of finger millet as influenced by herbicidal weed management practices at periodic intervals

Treatments	Plant height (cm)			
	30 DAS	60 DAS	90 DAS	At harvest
T_1: Weedy check	19.65	40.54	45.70	44.86
T_2: Weed free	35.87	66.00	73.54	72.02
T_3: Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE)	22.31	44.65	51.86	50.03
T_4: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE)	24.33	46.36	53.09	52.97
T_5: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE)	26.88	51.09	56.32	55.06
T_6: 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	25.82	49.98	55.44	54.77
T_7: Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	29.35	57.74	60.95	60.20
T_8: Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	27.43	52.11	57.47	56.94
T_9: Oxyfluorfen 23.5% EC @0.075 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @25 mL a.i. ha^{-1} (PoE)	31.03	60.75	63.49	62.79
T_{10}: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	28.31	53.55	58.48	57.53
T_{11}: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	31.89	62.49	66.92	66.47
T_{12}: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	28.60	54.53	60.05	59.85
T_{13}: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	32.95	65.08	67.05	67.00
SEm±	0.96	1.86	2.02	1.99
LSD (p=0.05)	2.80	5.42	5.91	5.81

Table 2: Number of tillers (m^{-2}) of finger millet as influenced by herbicidal weed management practices at periodic intervals

Treatments	Tillers (m^{-2})		
	60 DAS	90 DAS	At harvest
T_1: Weedy check	98.67	101.33	84.67
T_2: Weed free	121.33	123.33	106.00
T_3: Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE)	106.00	108.00	92.33
T_4: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE)	106.67	109.33	93.00
T_5: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE)	109.33	112.00	96.00
T_6: 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	108.67	110.67	94.00
T_7: Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	117.33	119.00	98.67
T_8: Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	113.00	115.33	96.50
T_9: Oxyfluorfen 23.5% EC @0.075 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @25 mL a.i. ha^{-1} (PoE)	118.67	121.00	100.33
T_{10}: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	113.33	116.00	97.00
T_{11}: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	118.67	121.67	100.67
T_{12}: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	115.00	118.33	98.33
T_{13}: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	120.67	122.00	103.67
SEm±	3.84	3.91	3.33
LSD (p=0.05)	11.20	11.40	9.72

Table 3: Chlorophyll content (SPAD value) of finger millet as influenced by herbicidal weed management practices at periodic intervals

Treatments	Chlorophyll content (SPAD value)		
	30 DAS	60 DAS	90 DAS
T_1: Weedy check	22.29	28.12	17.09
T_2: Weed free	29.71	49.77	33.95
T_3: Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE)	23.17	29.21	20.13
T_4: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE)	24.26	31.94	20.57
T_5: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE)	25.31	33.59	22.15
T_6: 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	25.01	33.02	21.67
T_7: Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	26.76	37.69	26.36
T_8: Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	25.70	35.51	22.94
T_9: Oxyfluorfen 23.5% EC @0.075 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @25 mL a.i. ha^{-1} (PoE)	26.95	38.17	27.40
T_{10}: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	26.30	36.62	23.42
T_{11}: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	27.82	41.36	29.83
T_{12}: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	26.37	37.33	24.74
T_{13}: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	28.58	42.11	32.33
SEm±	0.90	1.26	0.85
LSD (p=0.05)	2.63	3.67	2.48

Table 4: Dry matter accumulation (g m^{-2}) of finger millet as influenced by herbicidal weed management practices at periodic intervals

Treatments	Dry matter accumulation (g m^{-2})			
	30 DAS	60 DAS	90 DAS	At harvest
T_1: Weedy check	13.16	60.67	185.59	205.08
T_2: Weed free	29.77	102.55	312.01	398.12
T_3: Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE)	16.22	67.32	203.49	230.29
T_4: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE)	17.13	68.02	261.58	288.86
T_5: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE)	21.84	74.50	270.96	305.56
T_6: 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	20.05	72.50	267.72	301.59
T_7: Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	23.77	79.38	279.62	345.20
T_8: Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	21.93	76.05	273.00	311.85
T_9: Oxyfluorfen 23.5% EC @0.075 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @25 mL a.i. ha^{-1} (PoE)	24.56	80.10	280.98	350.79
T_{10}: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	23.05	77.85	274.86	320.28
T_{11}: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	25.33	81.99	283.44	357.71
T_{12}: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	23.56	78.83	276.90	325.15
T_{13}: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	25.47	96.90	300.48	385.90
SEm±	0.73	2.67	9.05	10.91
LSD (p=0.05)	2.12	7.80	26.42	31.84

Table 5: Crop growth rate (g m^{-2} day^{-1}) of finger millet as influenced by herbicidal weed management practices at periodic intervals

Treatments	Crop growth rate (g m^{-2} day^{-1})		
	30-60 DAS	60-90 DAS	90 DAS-At harvest
T_1: Weedy check	1.58	4.16	1.39
T_2: Weed free	2.43	6.98	6.15
T_3: Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE)	1.70	4.54	1.91
T_4: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE)	1.70	6.45	1.95
T_5: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE)	1.76	6.55	2.47
T_6: 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	1.75	6.51	2.42
T_7: Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	1.85	6.67	4.68
T_8: Oxyfluorfen 23.5% EC @ 0.075 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	1.80	6.57	2.78
T_9: Oxyfluorfen 23.5% EC @0.075 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @25 mL a.i. ha^{-1} (PoE)	1.85	6.70	4.99
T_{10}: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	1.83	6.57	3.24
T_{11}: Pendimethalin 30% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	1.89	6.72	5.32
T_{12}: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* 2,4-D 58% SL @ 0.5 L a.i. ha^{-1} (PoE)	1.84	6.60	3.45
T_{13}: Pretilachlor 50% EC @ 1 L a.i. ha^{-1} (PE) *fb* Bispyribac Sodium 10% SC @ 25 mL a.i. ha^{-1} (PoE)	2.38	6.79	6.10
SEm±	0.07	0.21	0.12
LSD (p=0.05)	0.19	0.63	0.34

Conclusion

On the basis of one year experiment it is to be concluded that pre-emergence herbicidal application of Pretilachlor 50% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} recorded significant improvement in growth characters of finger millet which was statistically at par with pre-emergence application of Pendimethalin 30% EC @ 1 L a.i. ha^{-1} *fb* Bispyribac sodium 10% SC @ 25 mL a.i. ha^{-1} under mid hills of Himachal Pradesh.

References

1. Ashrafi MDR, Singh MK, Tyagi S, Kumar A, Shambhavi S. Effect of weed management practices on transplanted finger millet (*Eleusine coracana* L.) in Bihar. International Journal of Chemical Studies. 2020;8(5):211-214.
2. Chandra D, Chandra S, Pallavi, Sharma AK. Review of finger millet (*Eleusine coracana* (L.) Gaertn): A powerhouse of health benefiting nutrients. Food Science and Human Wellness. 2016;5:149-155.
3. Degu E, Adugna A, Tadesse T, Tesso T. Genetic resources, breeding and production of millets in Ethiopia. In: New approaches to plant breeding of orphan crops in Africa. Proceedings of an International Conference, Bern, Switzerland; c2009.
4. Food and Agriculture Organization of the United Nations (FAO). Finger Millet. Accessed on 7 Sep, 2023. Available from: www.fao.org
5. Gupta N, Gupta AK, Gaur VS, Kumar A. Relationship of nitrogen use efficiency with the activities of enzymes involved in nitrogen uptake and assimilation of finger millet genotypes grown under different nitrogen inputs. The Scientific World Journal. 2012;2012:625731.
6. Holt J. Investigating the biology and epidemiology of blast in low-input farming systems in East Africa; c2000.
7. Agricultural and Processed Food Products Export Development Authority (APEDA). Indian Millets: Country-wise production data (last five years). Accessed on 27 June, 2023. Available from: www.apeda.gov.in
8. Kumar MKP, Shekara BG, Sunil CM, Yamuna BG. Response of drill-sown finger millet [*Eleusine coracana* (L.)] to pre and post-emergent herbicides. An International Quarterly Journal of Life Science. 2015;10(1):299-302.
9. Kushwaha HS, Tripathi ML, Singh VB. Weed management in coriander (*Coriandrum sativum*). In: Proceedings of the Second International Agronomy Congress on Balancing Food and Environmental Security: A Continuing Challenge. Indian Society of Agronomy; c2002; p. 985-987.
10. Mgonja MA. Finger Millet Blast Management in East Africa. Nairobi, Kenya: Workshop Abstract; c2005. p. 47.
11. Nyende P. Effect of soil fertility and weed management on the performance of finger millet in eastern Uganda. M.Sc. Thesis. Makerere University, Kampala, Uganda; c2000. p. 85.
12. Satish P, Lakra RK, Nargis K, Alam P, Puran AN. Weed management on direct-seeded finger millet under rainfed conditions of Jharkhand. International Journal of Current Microbiology and Applied Sciences. 2018;SP(7):844-850.
13. Department of Economic and Statistics, Government of Himachal Pradesh. Statistical Abstract of Himachal Pradesh. Shimla: Government of Himachal Pradesh; c2021-22.
14. Pandey S, Lakra KR, Kumari N, Alam P, Puran NA. Effect of post-emergence herbicide on weeds and economics of finger millet. Journal of Plant Development Sciences. 2018;10(2):89-95.