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Evaluation of Post-Emergence Herbicides in Transplanted Ragi (*Eleusinecoracana*)

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ABSTRACT

A field experiment was conducted at Agricultural College Farm, Bapatla during *kharif* 2017 to study the efficacy of post emergence herbicides against weeds in finger millet. Results of the experiment revealed that the application of Ethoxysulfuron @ 18.75 g a.i. ha^{-1} was effective and economical in controlling weeds in finger millet and is thus an effective alternative for manualweeding.

Key words: *Economics, Finger millet, Post-Emergence herbicides.*

Small millets offer enormous advantages such as early maturity, wide adaptability, low input cost and high nutritious value both for grain and fodder. Amongthese, Finger millet (*Eleusinecoracana*) is an important food crop next to rice, wheat and maize, and it is valued as a staple food in South India. The critical period for crop-weed competition is initial five weeks period from planting (Sundaresh *et al*., 1975). The production and productivity of finger millet is low because of heavy weed infestation and is a serious threat to its production. Uncontrolled weed growth during crop period has significantly reduced the grain yield ranging from 34 to 61 per cent (Ramachandra Prasad *et al.,*1991).

Keeping a crop weed free throughout the crop season is a labourious and cost intensive affair. With the discovery of synthetic herbicides in the early 1940s, there was a shift in control methods towards high input and target-oriented ones. Though the pre- emergence application of herbicides was found to be effective in controlling weeds, their usage is not only difficult but also can cause crop injury and effect environment because of higher doses used. Ecological problems emanating from the use of higher dose of herbicides lead to the birth of environmentally safer new generation of post-emergence herbicides, which are effective at very low doses in different crops (Dhiman and Singh, 2002). Hence, the present study was taken up to know the efficacy of different post emergence herbicides in transplanted finger millet.

MATERIAL AND METHODS

An experiment was conducted at Agricultural College Farm, Bapatla during *kharif* 2017 in sandy soil with a pH of 7.0, low in organic carbon (0.26%) and available nitrogen (125.44 kg ha^{-1}), medium in available phosphorus (13.44 kg ha^{-1}) and available potassium (112.4 kg ha^{-1}). A total rainfall of 666 mm was received in 27 rainy days during the crop growth period. The experiment was laid out in a randomized block design with ten treatments (Table 1) and replicated four times. VR 847 (srichaitanya) ragi variety was used in the study.Seedlings of 24 days old were transplanted with one seedling per hill on 11-08-2017. Row to row and plant to plant spacing adopted for transplanting was 30 X 10 cm. The recommended dose of 60, 30 and 30 kg N, P2O5 and K2O ha^{-1} was applied as basal at the time of transplanting. Top dressing of N at 30 $kgha^{-1}$was also done. The source for nitrogen, phosphorous and potassium were urea, single superphosphate and muriate of potash, respectively. The crop was irrigated as and when needed. All the recommended package of practices except weed management was adapted to raise the crop during experimentation. In weedy check, weeds were allowed to grow through out the crop growth period, where as in treatment T_2weed free conditions were maintained. First hand weeding was done at 15 DAT followed by a secondhand weeding at 30 DAT to remove weeds. Treatments involving the application of pre emergence herbicide $T_3$and post- emergence herbicides (T_4, T_5, T_6, T_7, T_8, $T_9$and T_{10}) were sprayed uniformly with a knapsack sprayer fitted with flood jet nozzle at 20 DAT. The spray volume used for the herbicide application was 500 L ha^{-1}. The data on weed density and weed drymatterwererecorded at harvest and were subjected to square root transformation($\sqrt{X + 0.5}$) before statistical analysis to normalize the distribution. The growth and yield attributes were recorded at the time of maturity. Economics of different treatments were calculated taking into account the prevailing market prices of input and output.

Table 1. Effect of weed management practices on weed density (No.m^{-2}), weeddrymatter (g m^{-2}) and weed control efficiency (%) in finger millet

Treatments	Weed density (No.m^{-2})	Weed Drymatter (g m^{-2})	Weed Control efficiency (%)
	Harvest	Harvest	Harvest
T_1 - Weedy check	21.5 (463.50)	10.09 (103.75)	-
T_2 - Hand weeding at 15 and 30 DAT	4.4 (19.00)	1.2 (0.95)	99.05
T_3 - Oxadiargyl @ 80 g a.i. ha^{-1} as PE	8.81 (84.00)	3.35 (11.42)	86.77
T_4 - Bispyribac sodium @ 25 g a.i. ha^{-1} as PoE at 20 DAT	15.29 (237.00)	4.33 (19.54)	77.45
T_5 - 2, 4-D sodium salt @ 800 g a.i. ha^{-1} as PoE at 20 DAT	15.64 (245.00)	6.07 (36.38)	61.87
T_6 - Ethoxysulfuron @ 18.75 g a.i. ha^{-1} as PoE at 20 DAT	6.89 (48.25)	3.16 (10.44)	89.44
T_7 - Penoxsulam @ 22.5 g a.i. ha^{-1} as PoE at 20 DAT	13.23 (184.00)	4.26 (19.66)	76.89
T_8 - Metsulfuron + Chlorimuronethyl @ 4 (2+2) g a.i. ha^{-1} as PoE at 20 DAT	9.42 (89.00)	3.45 (12.03)	88.13
T_9 - Topramezone @ 20 g a.i. ha^{-1} as PoE at 20 DAT	18.43 (348.25)	5.98 (35.55)	62.34
T_{10}- Tembotrione @ 100 g a.i. ha^{-1} as PoE at 20 DAT	17.71 (313.75)	5.58 (30.87)	66.15
SEm±	1.026	0.511	5.172
CD (P=0.05)	2.97	1.48	15.09
CV (%)	15.6	21.5	13.1

RESULTS AND DISCUSSION

Effect on weeds

The predominant weed species that were observed in the experimental field during investigation were *Phyllanthus niruri* and *Commelina benghalensis* among broad leaved weeds; *Dactyloctenium aegyptium* and *Digitaria marginata* among grasses; *Cyperus rotundus* amongsedges.

The data (Table 1) clearly shows that the density of the weeds is significantly influenced by the treatments at harvest stage of the crop growth. At harvest, the lowest weed density (4.40) was observed with hand weeding twice at 15 and 30 DAT (T_2). Among chemical treatments, the lowest weed density (6.89) was observed with the application of Ethoxysulfuron @ 18.75 g a.i. ha^{-1} (T_6) which was on par with hand weeding twice at 15 and 30 DAT (T_2) and application of Oxadiargyl @ 80 g a.i. ha^{-1} (T_3), Metsulfuron + Chlorimuronethyl @ 4 (2+2) g a.i. ha^{-1} (T_8) but significantly superior torest of thetreatments. The results are corroborating with those reported by Saini and Angiras (2002). At harvest, significantly the lower weed drymatter (0.95 g m^{-2}) was recorded with hand weeding twice at 15 and 30 DAT (T_2)(Table 1). Among herbicidal treatments significantly the lowerweeddrymatter (3.16gm^{-2}) wasr ecorded with the application of Ethoxysulfuron @ 18.75 g a.i. ha^{-1} (T_6) which was on par with hand weeding twice at 15 and 30 DAT (T_2), Oxadiargyl @ 80 g a.i .ha^{-1} (T_3) Bispyribac sodium @ 25g a.i. ha^{-1} (T_4), Penoxsulam @ 22.5 g a.i ha^{-1} (T_7) and Metsulfuron + Chlorimuronethyl @ 4 (2+2) g a.i. ha^{-1} (T_8). The reduced weed drymatter in these treatments could be due to effective control of grasses, sedges and broad leaved weeds at critical stages of crop growth. The highest weed drymatter was observed in weedy check (10.09g m^{-2}).

At harvest, significantly highest weed control efficiency (99.05 %) was observed with hand weeding twice at 15 and 30 DAT (Table 1). Among the herbicide treatments, the highest weed control efficiency (89.44 %) was observed with the application of Ethoxysulfuron

Table 2. Effect of weed management practices on plant drymatter at harvest (g m^{-2}), test weight (g), grain yield (kg ha^{-1}), weed index (%), harvest index (%), net returns and B:C ratio in finger millet

Treatments	Plant Drymatter (kg ha^{-1}) at Harvest	Test weight (g)	Grain yield (kg ha^{-1})	Weed index (%)	Harvest index (%)
T_1- Weedy check	5929	2.8	1213	50.1	26.59
T_2- Hand weeding at 15 and 30 DAT	10459	3.17	2459	0	26.43
T_3- Oxadiargyl @ 80 g a.i.ha^{-1} as PE	10135	3.15	2235	9.08	26.87
T_4- Bispyribac sodium @ 25 g a.i.ha^{-1} as PoE at 20 DAT	8905	2.94	1856	24.02	26.03
T_5- 2, 4-D sodium salt @ 800 g a.i.ha^{-1} as PoE at 20 DAT	7913	2.9	1720	29.84	26.89
T_6- Ethoxysulfuron @ 18.75 g a.i.ha^{-1} as PoE at 20 DAT	9227	3.07	2242	8.06	25.18
T_7- Penoxsulam @ 22.5 g a.i.ha^{-1} as PoEat 20 DAT	9082	2.96	2077	15.21	26.9
T_8- Metsulfuron + Chlorimuronethyl @ 4 (2+2) g a.i.ha^{-1} as PoE at 20 DAT	9196	3.01	2169	11.87	26.53
T_9-Topramezone @ 20 g a.i.ha^{-1} as PoE at 20 DAT	-	-	-	100	-
T_{10}-Tembotrione @ 100 g a.i.ha^{-1} as PoE at 20 DAT	-	-	-	100	-
SEm±	271.71	0.082	117.35	4.25	1.33
CD (P=0.05)	799.12	NS	345.14	12.34	NS
CV (%)	6.1	5.4	11.7	24.4	10

@ 18.75 g a.i. ha^{-1} (T_6) which was on par with hand weeding twice at 15 and 30 DAT (99.05 %), Oxadiargyl @ 80 g a.i.ha^{-1} (86.77 %),Bispyribac sodium @ 25 g a.i.ha^{-1}(77.45 %), Penoxsulam @ 22.5 g a.i.ha^{-1}(76.89 %) and Metsulfuron + Chlorimuronethyl @ 4 (2+2) g a.i.ha^{-1}(88.13 %). This is due better control of weeds over the weedy check than all other herbicidesstudied.

Effect on crop

Herbicide application exhibited profound influence on growth parameters of finger millet*viz*., drymatter accumulation. There is no significant influence on test weight and harvestindex. At harvest, the maximum dry matter production was recorded with the treatment hand weeding twice at 15 and 30 DAT and it was on par with application of Oxadiargyl @ 80 g a.i. ha^{-1} (T_3). Among the herbicidal treatments the maximumdry matter production was obtained with the application of Ethoxysulfuron @ 18.75 g a.i.ha^{-1} (T_6) which was on par with the treatments (T_3, T_7, T_8)The data on grain yield given in the (Table 2) clearly showed that the highest grain yield was obtained in hand weeding (2459 kg ha^{-1}). Among the herbicide treatments application of Ethoxysulfuron @ 18.75 g a.i. ha^{-1} (T_6) gave higher yield (2242 kg ha^{-1}) which was on par with hand weeding (2459 kg ha^{-1}), application of Oxadiargyl @ 80 g a.i.ha^{-1}(2235 kg ha^{-1}), Penoxsulam @ 22.5 g a.i.ha^{-1}(2077 kg ha^{-1}) and Metsulfuron + Chlorimuronethyl @ 4 (2+2) g a.i.ha^{-1}(2169 kg ha^{-1}). Among the herbicidal treatments, the lowest weed index (8.06 %) was observed with the application of Ethoxysulfuron @ 18.75 g a.i. ha^{-1} (T_6) which was on par with Oxadiargyl @ 80 g a.i.ha^{-1} (9.08 %), Penoxsulam @ 22.5 g a.i.ha^{-1}(15.21 %) and Metsulfuron + Chlorimuronethyl @ 4 (2+2) g a.i.ha^{-1}(11.87%).

The highest net returns and benefit cost ratio are with application of Ethoxysulfuron @ 18.75 g a.i. ha^{-1} (T_6). Though the hand weeding resulted in highest grain yield, net returns and benefit cost ratio were lower

compared to Ethoxysulfuron@ 18.75 g a.i. ha^{-1} (T_6) due to expensive handweeding.

CONCLUSION

On the basis of results obtained in the present experiment, it can be concluded that the application of Ethoxysulfuron @ 18.75 g a.i. ha^{-1} (T_6) was effective and economical in controlling weeds in finger millet and is thus an effective alternative for manual weeding.

LITERATURE CITED

Dhiman Mukherjee and Singh R P 2002 Herbicides betting on low dose options. *Agriculture Today*. pp. 44-45.

Ramachandra Prasad, T V, Narasimha N, Dwarakanath N, Munegowda M K and Krishnamurthy K 1991 Integrated weed management in drilled finger millet. *Mysore Journal of Agricultural Sciences.* 25: 13-19.

Saini J P and Angiras N N 2002 Evaluation of ethoxysulfuron against broad leaved weeds and sedges in direct seeded puddle rice. *Indian Journal of Weed Science*. 34(1&2): 36-38.

Sundaresh H N, Rajappa M G, Linge gowda B K and Krishnashastry K S 1975 Critical stages of crop weed competition in ragi under rainfed condition. *Mysore Journal of Agricultural Science.*9(4): 582-585.

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