



Weed management in transplanted ragi

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Finger millet is the most important small millet grown in India in an area of 1.26 M ha with a production of 1.89 M t and a productivity of 1.48t/ha (Ministry of Agriculture 2010). The production and productivity of finger millet is low because of inefficient irrigation, nutrient management, heavy weed infestation, incidence of blast disease *etc.* Among these, weed infestation is a serious threat to its production. Uncontrolled weed growth during crop period reduced the grain yield ranging from 34 to 61% (Ramachandra Prasad *et al.* 1991). The critical period for crop-weed competition is five weeks after planting (Nanjappa 1980). In order to increase the productivity, it is imperative to minimize weed competition particularly during the critical period of the crop. Although manual weeding is effective, it is time consuming and labour intensive. By the time it practiced, the crop will have been sufficiently damaged by weed competition. So, controlling weeds by the use of herbicides is receiving attention due to shortage of labour and increased labour wages. There is also a demand from farmers for the selective pre or post emergence herbicides which became cheaper when compared to manual weeding for timely control of weeds in ragi crop. Hence, this investigation was planned with an objective to find out the most suitable weed management practice for control of weeds in transplanted ragi.

A field experiment was conducted during *Kharif* 2011 at Agricultural College, Bapatla, Guntur, Andhra Pradesh. The soil of the experimental field was sandy soil in texture with low in available nitrogen but medium in available phosphorus and potassium with a pH of 7.6. The experiment consisting of ten treatments was laid out in a randomized block design with three replications. Ragi seedlings of 30 days old were transplanted with one seedling per hill with a spacing of 30 x 10 cm. The recommended dose of 30, 70 and 25 kg N, P₂O₅ and K₂O/ha was applied as basal at the time of transplanting. Top dressing of N at 30 kg/ha was also done. The source for nitrogen, phosphorous and potassium were urea, single super phosphate 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. Data on weed density and weed dry matter were recorded at harvest. The data on weed density was subjected to square root $\sqrt{x+0.5}$ transformations before statistical analysis to normalize their distribution. Growth parameters like plant height, drymatter production, number of productive tillers, grains per finger and grain yield were recorded at harvest.

Effect on weeds

The dominant weed flora of the experimental field was *Cynodon dactylon* and *Digitaria marginata* among grasses; *Cyperus bulbosus*, among sedges; *Sesamum ekamberi*, *Trianthema portulacastrum*, and *Portulaca oleracea* were broad-leaved weeds.

All the weed control treatments significantly reduced the weed growth over weedy check at harvest (Table 1). All the integrated treatments were significantly superior to alone application of herbicides but at par with sequential application of herbicides in reducing weed density and weed dry weight. Among the treatments, pre-emergence application of oxadiargyl 100g/ha *fb* inter-cultivation with weeder at 20 DAT recorded the lowest weed growth with higher weed control efficiency and was on par with all other treatments including hand weeding at 15 and 30 DAT. Among alone application of herbicides, pre-emergence application of oxadiargyl 100g/ha recorded the lowest weed growth but was at par with other alone application of herbicides.

Effect on crop

Slight phytotoxicity was observed with the post-emergence application of bispyribac sodium 25 g/ha but crop recovered subsequently within a week. All the weed control treatments significantly improved the growth, yield components and yield of ragi over weedy check (Table 2). Among the treatments, pre-emergence application of oxadiargyl 100 g/ha *fb* inter-cultivation at 20 DAT recorded higher plant height, crop dry weight, maximum number of productive tillers, grains per finger and highest grain yield of 2.47 t/ha and it was on par with all other treatments including hand weeding treatment which recorded the highest grain yield (2.63 t/ha) but significantly superior to alone application of

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Table 1. Effect of weed management treatments on weed and crop growth parameters in transplanted ragi

Treatment	Dose (g/ha)	Time (DAT)	Weed density (no./m ²) at harvest	Weed dry weight (g/m ²) at harvest	WCE (%) at harvest	Plant height (cm)	Productive tillers (no./m ²) at harvest	Crop dry wt. at harvest (g/m ²)
Pendimethalin	750	3	7.88 (62.0)	74.33	45	94.6	80.7	637.3
Oxadiargyl	100	3	7.80 (60.3)	72.67	46	96.0	83.3	648.3
Bispyribac sodium	25	15	7.88 (61.6)	73.43	45	93.9	81.3	623.1
Pendimethalin <i>fb</i> bispyribac sodium	750 <i>fb</i> 25	20	5.94 (34.8)	58.43	57	98.1	98.0	780.1
Oxadiargyl <i>fb</i> bispyribac sodium	100 <i>fb</i> 25	3 <i>fb</i> 20	5.72 (32.3)	56.23	59	100.0	99.0	792.9
Pendimethalin <i>fb</i> intercultivation	750	3 <i>fb</i> 20	5.24 (26.9)	55.13	59	102.1	104.3	812.0
Oxadiargyl <i>fb</i> intercultivation	100	3 <i>fb</i> 20	4.84 (23.1)	49.27	63	106.8	105.3	837.1
Bispyribac sodium <i>fb</i> intercultivation	25	15 <i>fb</i> 30	5.12 (26.2)	50.23	63	96.5	101.3	809.7
Hand weeding	-	15 and 30	4.20 (17.6)	40.20	70	112.0	112.3	868.5
Weedy check	-	-	10.68 (113.6)	135.43	-	82.2	61.0	468.9
LSD (P=0.05)			0.88	12.47	9	12.8	16.8	147.7

DAT-Days After Transplanting, Data transformed to $\sqrt{x+0.5}$ transformation in case of weed density. Figures in parentheses are original values

Table 2. Effect of different treatments on yield, yield parameters and economics of transplanted ragi

Treatment	Dose (g/ha)	Time (DAS)	Fingers per ear (no.)	No. of grains per finger (no.)	Test weight (g)	Grain yield (t/ha)	Straw yield (t/ha)	Net returns (x10 ³ /ha)	Returns per rupee investment (₹)
Pendimethalin	750	3	7.10	99.7	2.82	1.77	5.60	12.40	1.98
Oxadiargyl	100	3	7.11	100.7	2.88	1.80	5.66	12.88	2.02
Bispyribac-sodium	25	15	7.07	97.7	2.86	1.75	5.54	11.40	1.86
Pendimethalin <i>fb</i> bispyribac- sodium	750 <i>fb</i> 25	20	7.23	122.3	2.88	2.33	6.42	17.97	2.25
Oxadiargyl <i>fb</i> bispyribac sodium	100 <i>fb</i> 25	3 <i>fb</i> 20	7.26	129.0	2.89	2.36	6.55	18.52	2.29
Pendimethalin <i>fb</i> inter-cultivation	750	3 <i>fb</i> 20	7.30	137.3	2.91	2.39	6.66	18.39	2.24
Oxadiargyl <i>fb</i> inter-cultivation	100	3 <i>fb</i> 20	7.34	141.3	2.92	2.46	6.85	19.44	2.31
Bispyribac sodium <i>fb</i> inter-cultivation	25	15 <i>fb</i> 30	7.23	136.3	2.89	2.38	6.57	17.50	2.12
Hand weeding	-	15 & 30	7.42	148.0	2.94	2.63	7.27	16.03	1.78
Weedy check	-	-	6.93	79.7	2.70	1.17	3.81	5.08	1.44
LSD (P=0.05)			NS	13.9	NS	0.30	0.84		

herbicides. Among the alone application of herbicides, oxadiargyl 100 g/ha recorded the highest grain yield (1.809 t/ha) followed by pendimethalin (1.77 t/ha). The increased yield in the inter-cultivation and sequential treatments might be due to better weed control at initial stages by pre-emergence application of herbicides and subsequently by inter-cultivation or sequential application of herbicides during critical period of crop-weed competition, which might have resulted in increased and translocation of photosynthates sufficient to the sink needs. The results are similar with those reported by Channa Naik *et al.* (2000) with the application of butachlor at 0.5 kg/ha along with hoeing. The lowest yield (1.17 t/ha) was observed in weedy check with a yield loss of 55% compared to two hand weedings.

Among the weed management treatments, the highest net returns (₹ 19,436/-) and the highest returns per rupee investment (2.31) were obtained with the treatment, pre-emergence application of oxadiargyl 100 g/ha *fb* inter-cultivation at 20 DAT. The higher net returns in this inter-cultivation treatment (T₈), when compared to hand weeding was not because of higher yield, but because of lower cost involved in herbicide application and in intercultivation than hand weeding.

SUMMARY

Among the treatments, pre-emergence application of oxadiargyl 100 g/ha *fb* intercultivation at 20 DAT should significantly higher growth and yield attributes.

From the results, it can be summarised that the highest grain yield and maximum economic returns in transplanted ragi were obtained with pre-emergence application of oxadiargyl 100 g/ha *fb* intercultivation at 20 DAT by obtaining season-long weed control.

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