The Andhra Agric. J 60 (4):959-961, 2013

Nutrient Uptake and Yield of Transplanted Ragi as Influenced by Pre and Post Emergence Herbicides

Key words : Sequential application, Nutrient uptake, Transplanted ragi

Ragi is the most important small millet grown in India in an area of 1.26 M.ha with a production of 1.89M t and the productivity is1.48t ha^{-1}. In Andhra Pradesh, it is grown in an area of 45,000 ha with a production of 53,000 t and a productivity of 1178 kg ha^{-1} (Ministry of Agriculture, 2010).The production and productivity of finger millet is lower because of insufficient irrigation and improper nutrient management, heavy weed infestation and incidence of blast etc. Among these, weed infestation is a serious threat to its production. Uncontrolled weed growth during crop period significantly reduces the grain yield ranging from 34 to 61 per cent (Ramachandra Prasad *et. al*., 1991).Nanjappa *et al.* (1987) reported that during the first 2 to 6 weeks period after transplanting, the weeds removed a major amount of soil nutrients during critical period of crop weed competition in ragi thus causing severe yield losses.

Effective weed management is needed for accomplishment of higher yield. It warrants for timely weeding and intercultivation within the critical period. Further, the work done so far on sequential application of herbicides and along with intercultivation and nutrient uptake by transplanted ragi and its associated weeds was meagre. Keeping this in view, the present investigation was undertaken to study the effect of different herbicidal treatments in transplanted ragi.

A field experiment was carried out during *kharif*, 2011 at Agricultural College Farm, Bapatla. The experimental soil was sandy in texture, slightly alkaline in reaction (pH 7.6), low in organic carbon (0.4 per cent) and available nitrogen (165.0 kg ha^{-1}), medium in available phosphorus (25.0 kg ha^{-1}) and potassium (347.5 kg ha^{-1}) with pH 7.6 and E.C1.7 dSm^{-1}. The experiment consisted of ten weed management treatments (Table 1), which was laid out in a randomised block design and replicated thrice. The ragi variety Bharathi (VR762) of 120 days was sown on 2.7.11 in nursery and transplanted after 30 days on 2.8.11.Recommended fertilizer dose(30:70:25kg NPK ha^{-1}) was applied to the crop. The pre- emergence herbicides were applied at 3 DAT as sand mix application and the post emergence herbicides were applied at 15 and 20 DAT through knap-sack sprayer using a spray volume of 500 L ha^{-1}.

The dominant weed flora of the experimental plots cinsisted of *Cynodon dactylon* and *Digitaria marginata* among grasses; *Cyperus bulbosus* among sedges; *Sesame spp., Trianthema portulacastrum*, *Portulaca oleracea* and *Portulaca oleracea* among broad leaved weeds.

All the herbicides applied either alone or in sequence or followed by intercultivation effectively controlled the weeds over weedy check and the intercultivation treatments recorded higher weed control efficiency ranged from 64 to 74 per cent at 60 DAT. Among the herbicide treatments, sequential application of oxadiargyl 100 g ha^{-1} fb intercultivation at 20 DAT (T_8) recorded the lower weed density, drymatter and high weed control efficiency over alone application of herbicides and was on a par with all other treatments except single application of herbicides(T_2, T_3 and T_4). This was due to reduced weed growth observed in intercultivation and sequential treatments because of their broad spectrum weed control at later stages when compared to alone treatments. The results are akin to those reported by Naik *et al*. (2001), Ramachandra Prasad *et al.* (1991) and Nanjappa (1980).

Among herbicidal treatments, oxadiargyl 100 g ha^{-1} followed by intercultivation at 20 DAT (T_8) was significantly with higher N, P and K uptake (47.8, 15.6 and 74.3 kg ha^{-1}) and was on par with all other treatments except single application of herbicides. The increased nutrient uptake by crop in this treatment might be due to reduced weed

Table. 1. Effect of weed management treatments on nutrient uptake by transplanted ragi and associated weeds

Treatment	Dose (g ha^{-1})	Time (DAS)	Weed dry weight (g m^{-2}) at 60 DAT	Crop Drymatter (g m^{-2}) at 60 DAT	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Nutrient uptake (kg ha^{-1}) by crop at 60 DAT			Nutrient uptake (kg ha^{-1}) by weeds at 60 DAT		
							N	P_2O_5	K_2O	N	P_2O_5	K_2O
T_1: Hand weeding	—	15 & 30	38.60	696.5	2635	7272	52.23	17.12	80.80	5.29	1.55	5.38
T_2: Pendimethalin	750	3	85.23	518.3	1777	5606	36.25	11.38	48.19	15.88	4.18	14.48
T_3: Oxadiargyl	100	3	79.87	529.8	1809	5667	37.50	11.81	50.88	14.02	3.88	13.39
T_4: Bispyribac sodium	20	15	76.45	514.8	1755	5549	35.86	11.33	46.40	14.01	3.86	12.93
T_5: Pendimethalin fb bispyribac sodium	750fb25	20	64.37	622.1	2332	6424	44.81	14.56	64.05	10.92	3.06	10.38
T_6: Oxadiargyl fb bispyribac sodium	100fb25	20	63.23	623.1	2367	6553	45.10	14.80	65.58	10.94	2.74	10.01
T_7: Pendimethalin fb intercultivation	100 fb 25	3 fb 20	60.43	634.7	2394	6662	46.77	15.20	68.97	10.57	2.67	9.25
T_8: Oxadiargyl fb intercultivation	100 fb 25	3 fb 20	55.35	645.2	2466	6853	47.81	15.62	74.32	8.67	2.32	8.24
T_9: Bispyribac sodium fb intercultivation	20 fb 25	15 fb 20	44.62	630.5	2382	6573	46.24	14.97	69.04	7.38	2.00	6.85
T_{10}: Weedy check	—	—	170.57	426.2	1177	3817	29.54	8.78	36.29	32.46	8.88	29.80
SEm±			5.17	27.4	101	283	2.27	0.92	4.28	0.94	0.26	1.00
CD (P = 0.05)			15.37	81.4	300	840	6.65	2.72	12.72	2.78	0.77	3.10

density which in turn resulted in more crop dry matter accumulation and ultimately higher grain yield.

The NPK uptake by weeds was recorded maximum in weedy check (32.5, 8.9 and 29.8 kg ha^{-1} respectively) when compared to other treatments. The increased uptake of these nutrients in this treatment might be due to unchecked weed growth that resulted in high weed density and dry weight and absorbed more nutrients. The N, P and K uptake by weeds was minimum with the application of bispyribac sodium 25 g ha^{-1} followed by intercultivation with star weeder at 20 DAT which was because of lower weed dry weight in this treatment. Similar reports on nutrient uptake in transplanted ragi were observed by Naik *et al.* (2000).

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(Received on 05.06.2012 and revised on 30.09.2012)