The Andhra Agric. J 63 (2): 270-272, 2016

Influence of Different Weed Management Practices on Weed Suppression in Transplanted Finger Millet (Eleusine coracana (L.) Gaertn.)

B Bhargavi, N Sunitha, Y Reddi Ramu and P Sudhakar
Department of Agronomy, S V Agricultural College, Tirupati 517 502, Andhra Pradesh

ABSTRACT

A Field experiment conducted during kharif, 2013, at S V Agricultural College, Farin, Tirupati revealed that pre-emergence application of oxyflourfen @ 0.1 kg a.i ha^{-1} at 3 DAT fb post-emergence application of azimsulfuron @ 20 g a.i ha^{-1} applied at 20 DAT or hand weeding at 20 DAT resulted in lesser weed density and weed dry matter production, which in turn favourably influened the yield and economic returns of transplanted finger millet compared to other weed control treatments. The unweeded check recorded the maximum weed population and weed dry matter and hence, resulted in drastic yield reduction of about 47 per cent in transplanted finger millet.

Key words : Economics, Finger Millet, Herbicides, Sequential application and Yield.

Finger millet (Eleusine coracana (L.) Gaertn.) 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 a productivity of 1.48 t ha^{-1}. In Andhra Pradesh, it occupied an area of 44,000 ha with a contribution of 54 thousand tonnes and a productivity of 1175 kg ha^{-1} (Minstry of Agriculture, 2012). Among the various reasons, weed infestation is a major hurdle which limits its productivity levels. Uncontrolled weed growth during the crop period significantly reduced the grain yield ranging from 34 to 61 per cent (Ramachandra Prasad et. al., 1991).

Effective weed management during early stages of crop growth period assumes important for accomplishment of higher yield. Although manual weeding is effective, it is laborious, costly and time consuming. The scarcity of manpower unables to take up hand weeding at critical period of weed infestation in finger millet. Under such situations, application of herbicides may provide best alternative to hand weeding for timely weed control and optimizing the yield of finger millet. However, increased consciousness about the soil and water pollution has widened the scope of using the low dose herbicides such as sulfonyl urea herbicides, which are effective even at as low as few grams per hectare (Guruprasanna et. al., 2004).

MATERIALS AND METHODS

A Field experiment was carried out during kharif, 2013 at S V Agricultural College Farm, Tirupati. The experimental soil was sandy clay loam in texture, neutral in reaction (pH 6.9), low in organic carbon (0.4 per cent), available nitrogen (215.0 kg ha^{-1}), available phosphorus (23.5 kg ha^{-1}) and medium in potassium (250.2 kg ha^{-1}). The experiment was laid out in randomised blockdesign replicated three times with 10 treatments (Table 1). The finger millet variety used was Vakula, by adopting seed rate of 3 kg ha^{-1}. The recommended dose of 60 kg N, 30 kg P_2O_5 and 30kg K_2O ha^{-1} was applied through urea, single super phosphate and muriate of potash respectively. Full dose of phosphorus, potassium and half of the nitrogen were appiled as basal at the time of transplanting. The remaining half of the nitrogen was top dressed at tillering. The pre-emergence herbicides were applied at 3 DAT and the post emeregence herbicides were applied at 20 DAT through knap-sack sprayer using a spray volume of 500 L ha^{-1}. The data on weed density and dry matter were subjected to square root transformation.

RESULTS AND DISCUSSION

The dominnant weed flora of the experimental plots consisted of Cynodon dactylon and Digitaria sanguinalis among grasses; Cyperus rotundus among sedges; Eclipta alba, Phyllanthus niruri, Ipomoea pestigridis and Rhynchosia minima were broad leaved weeds.

Among the weed management practices tried, the lowest density and dry weight of the seeds

Table 1. Effect of weed management treatments on weed dynamics, yield and economics of transplanted finger millet.

Treatments	Weed density (No.m-2) at harvest	Weed dry matter (g m-2) at harvest	Weed control efficiency (%)	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Gross returns	Net returns	B:C ratio
T_1 - Oxyflourfen @ 0.1 kg a.i ha^{-1} + as pre-emergence	12.79 (163.10)	10.28 (115.39)	56.1 (48.50)	2134	2984	39904	19292	1.93
T_2- Oxydiargyl @ 75 kg a.i ha^{-1} + as pre-emergence	13.03 (15.42)	10.77 (115.39)	51.8 (46.03)	2129	2968	39806	18884	1.90
T_3- Oxyflourfen + hand weeding at 20 DAT	3.99 (15.42)	2.57 (6.13)	97.4 (80.72)	3194	4236	59610	37498	2.70
T_4- Oxydiargyl + hand weeding at 20 DAT	10.80 (116.11)	7.04 (49.02)	79.5 (63.08)	2478	3562	46385	23513	2.03
T_5- Oxyflourfen @ 0.1 kg a.i ha^{-1} + azimulfuron @ 20 g a.i ha^{-1} at 20 DAT	3.36 (10.81)	2.22 (4.45)	98.1 (82.07)	3383	4241	63015	41131	2.88
T_6- Oxydiargyl @ 0.1 kg a.i ha^{-1} + azimulfuron @ 20 g a.i ha^{-1} at 20 DAT	11.10 (122.75)	7.01 (48.59)	79.7 (63.22)	2476	3568	46352	24158	2.09
T_7- Oxyflourfen + Chlorimuronethyl @ 5 g a.i ha^{-1} at 20 DAT	6.47 (41.40)	4.90 (23.53)	90.2 (71.75)	2830	3772	52826	31831	2.52
T_8- Oxydiargyl + Chlorimuronethyl @ 5 g a.i ha^{-1} at 20 DAT	10.99 (120.20)	7.03 (48.93)	79.6 (63.15)	2480	3563	46422	25117	2.18
T_9- Hand weeding twice at 20 and 40 DAT	6.15 (37.28)	4.63 (20.97)	91.2 (72.74)	2834	3778	52901	28315	2.15
T_{10}- Un weeding check (Control)	17.19 (294.97)	15.49 (239.32)	0.0 (0.52)	1782	2468	33310	13224	1.66
S.Em±	0.719	0.663	4.11	162	184	2256	2463	0.092
CD (P=0.05)	1.51	1.39	8.6	340	387	4740	5175	0.19

Data in parenthesis are pre-transformed original values, which are transformed to $\sqrt{x+0.5}$ and analyzed statistically.

viz., grasses, sedges and BLW and highest weed control efficiency were recorded with pre-emergence application of oxyflourfen @ 0.1 kg a.i ha^{-1} + azimulfuron @ 20 g a.i ha^{-1} applied at 20 DAT (T_5), which was however on par with pre-emergence application of oxyflourfen @ 0.1 kg a.i ha^{-1} + hand weeding at 20 DAT (T_3). This might be due to the effectiveness of pre-emergence application of oxyflourfen in controlling weeds through accumulation of protoporphyric IX, a photosensitizing porphyrin, which destructs membrane and produces ethane resulting in killing of weeds at early stages (Morishima et al., 1990). Post-emergence application of azimsulfuron at 20 DAT of finger millet was found to be superior in suppressing the annual sedges *viz.,* Cyperus rotundus (L.) as well as broad leaved weeds by inhibiting, the acetolactate synthase enzyme involved in synthesis of branched chain amino acids which in turn inhibited the cell division and growth of the target weeds (Umbarger *et al.,* 1978). The highest density and dry weight of all the catergories of weeds was registered under unweeded check due to heavy weed infestation throughout the crop

growing period, which exploited the growth resources at the cost of finger millet. The higher weed control efficiency values of 98.1 and 97.4 per cent were obtained with pre-emergence application of oxyflourfen + azimsulfuron aplied at 20 DAT (T_5) and pre-emergence aplication of oxyflourfen + hand weeding at 20 DAT (T_3) respectively compared to unweeded check.

Compared to all other weed control treatments, grain yield, straw yield and economics were significantly higher in the treatments of pre-emergence application of oxyflourfen + azimsulfuron applied at 20 DAT (T_5), which was on par with pre-emergence application of oxyflourfen +hand weeding at 20 DAT (T_3). The weed control at earlier stages upto 35 DAT, critical period of crop weed competition was acheived with pre-emergence application of oxyflourfen. Application of azimsulfuron at 20 DAT or hand weeding imposed at 20 DAT were proved to be equally effective in suppressing the se3cond flush of weeds at later stages. This situation provided congenial environment for better expression of yield parameters viz., productive tillers m^{-2}, number of fingers ear^{-1}, ear weight inclucing higher thousnad grain weight. The cumulative effect of vegetative growth stature and the yield components resulted in higher grain and straw yields. These results corroborate with the findings of Adikant Pradhan *et al.* 2010. The net returns and B:C ratio was higher with the pre-emergence application of oxyflourfen + azimsulfuron applied at 20 DAT (T_5), which was on par with pre-emergence application of oxyflourfen + hand weeding at 20 DAT (T_3). This was due to reduced cost of weeding with higher grain and straw yields.

Therefore, either weed control practice involving herbicides as pre-emergence application of oxyflourfen + azimsulfuron applied at 20 DAT or integrated weed management practice of pre-emergence application of oxyflourfen + hand weeding at 20 DAT were proved to be the best practices for effective weed suprression to obtain high yield in transplanted finger millet.

LIERATURE CITED

Adikant Pradhan rajput A S and Thakur A 2010 Effect of weed management on growth and yield of finger millet. I*ndian Jorunal of Weed Science,* 42 (1 & 2): 53-56.

Guruprasanna H L, Prabhakara Setty T K and Nanjappa H V 2004 Efficiency of chlorimuron ehtyl in control of weeds in transplanted finter millet. *Mysore Journal of Agricultural sceicnes,* 38 (3): 289-293.

Ministry of Agriculture 2012 Government of India, www.indiastat.com

Morishima Y, Osabe H and Goto Y 1990 Action mechanism of DLH-1777, a novel 4-pyridine -3- carboxamide herbicide: peroxidising activity and accumulation of porphyrins. *Journal of Pesticide Science,* 15:553-559.

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.

Umbarger H E 1978 Amino acid biosynthesis and its regulations. *Annual Review of Biochemsitry,* 47: 533-606.

(Received on 16.06.2014 and revised on 05.02.2016)