

Weed Dynamics, Growth and Yield of Transplanted Finger Millet as Influenced by Different Weed Management Practices

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ABSTRACT

A field experiment conducted during summer, 2009 at Experimental Farm, Annamalai University to study the weed management options in transplanted finger millet. Pre-emergence (PE) application of oxyflourfen @ 0.1 kg/ha at 3 days after transplanting (DAT) followed by (fb) post-emergence (PoE) application of azimsulfuron @ 20 g/ha applied at 20 DAT resulted in lesser weed density, weed dry matter, maximum plant height, tillers/m², dry matter production which in turn favourably influenced the grain yield and straw yield of transplanted finger millet compared to other weed control treatments. The unweeded check recorded the smaller plants and lesser dry matter and hence, resulted in yield reduction of about 47% in transplanted finger millet.

Key words: Finger millet, Herbicides, Sequential application, Weed density, Yield.

INTRODUCTION

Finger millet [*Eleusine coracana* (L.) Gaertn] is the most important millet crop of India, next to sorghum and pearl millet². It is cultivated on an area of 1.26 m. ha with a production of 1.89mt having an average productivity of 1.48 t/ha. In Andhra Pradesh, it occupied an area of 44,000 ha with a contribution of 54 thousand tonnes and a productivity of 1.175 t/ha⁵. Among the various reasons, weed infestation is a major hurdle which limits its productivity level. Uncontrolled weed growth during the crop period significantly reduced the grain yield ranging from 34 to 61%⁸. 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 HW 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 low low rates like few g/ha³. Hence a study was carried out to find out the effective measures of weed control, by combining of herbicides with cultural practices.

MATERIAL AND METHODS

A field experiment was carried out during summer, 2009 at Experimental farm, Annamalai University.

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Tire experimental soil was sandy clay loam in texture, neutral in reaction (pH 6.9), low in OC (0.4%), available N (215.0 kg/ha), available P

(23.5 kg/ha) and medium in K (250.2 kg/ha). The experiment was laid out in a randomised block.

Table1. Effect of weed management practices on growth parameters of transplanted finger millet

Treatments	Plant height (cm)		Leaf area index (LAI)	Dry matter production (kg/ha)		Productive tillers (No./m ²)
	60 DAT At harvest		60 DAT	60 DAT	At harvest	
Oxyflourfen @ 0.1 kg/ha as PE	80.2	85.4	4.32	5194	6437	66.1
Oxadiargyl @ 75 g/ha as PE	80.0	85.2	4.30	5103	6394	62.6
Oxyflourfen @ 0.1 kg/ha as PE fb HW at 20 DAT	107.4	116.2	6.51	8413	9625	106.8
Oxadiargyl fb HW at 20 DAT	89.2	96.0	4.82	6043	7123	73.5
Oxyflourfen fb azimsulfuron @ 20 g/ha at 20 DAT	107.7	116.8	6.62	8435	9653	110.4
Oxadiargyl fb azimsulfuron @ 20 g/ha at 20 DAT	89.3	96.1	4.81	6124	7241	74.6
Oxyflourfen fb chlorimuron-ethyl @ 5 g/ha at 20 DAT	98.2	106.1	5.72	7568	8472	85.3
Oxadiargyl fb chlorimuron-ethyl @ 5 g/ha at 20 DAT	89.0	96.2	4.86	6119	7209	74.4
HW twice at 20 and 40 DAT	98.3	106.2	5.79	7594	8694	86.1
Unweeded check (Control)	73.9	75.1	3.76	4477	5239	46.7
S.Em ±	2.98	3.18	0.164	264	242.9	2.80
CD (P = 0.05)	8.8	9.4	0.48	784	721	8.3

design replicated three times with 10 treatments (Table 1). The finger millet variety 'Vakula' was transplanted at 25 days old with a spacing of 20 x 10 cm with one seedling/ hill. The recommended dose of 60 kg N, 30 kg P₂O₅ and 30 kg K₂O/ha was applied through urea, single super phosphate and muriate of potash respectively. Full dose of phosphorus, potassium and half of the nitrogen were applied as basal at the time of transplanting. The remaining half of the nitrogen was top dressed at tillering. The PE herbicides were applied at 3 DAT and the PoE herbicides were applied at 20 DAT through knap-sack sprayer using a spray volume of 500 L/ha. The data on weed density and dry matter at harvest were collected using a quadrat in each plot and then subjected to square root transformation. Grain and straw were sun dried to optimum moisture level and weight was recorded for each plot and computed on hectare basis.

The dominant weed flora of the experimental plots consisted of *Cynodon dactylon* (51%) and *Digitaria sanguinalis* (36%) among grasses; *Cyperus rotundus* among sedges; *Eclipta alba* (71%),

Phyllanthus niruri (11%), *Ipomoea pestigridis* (8%) and *Rhynchosia minima* (6%) among broad leaved weeds (BLW).

Density and dry matter of weeds

At 20 DAT the lowest total weed density and dry matter was observed in the treatments where PE application of oxyflourfen was done compared to the treatments that received PE application of oxadiargyl. This might be due to PE application of oxyflourfen, which inhibits PPG-oxidase in chloroplasts and mitochondria there by blocking of chlorophyll synthesis leading to excessive formation of singlet oxygen generating protoporphyrin IX, eventually leading to membrane destruction and killing of weeds⁶. These results were in line with Adikant Pradhan *et al.*¹.

At 40 DAT, the lowest density and dry matter of weeds was registered where oxyflourfen was applied as PE fb azimsulfuron applied at 20 DAT (T₅), which was on par with PE application of oxyflourfen fb HW at 20 DAT (T₃). PoE application of azimsulfuron applied at 20 DAT of finger millet was found superior in suppressing the annual sedges *viz.*, *Cyperus rotundus* (L.) and

BLW. As per the mode of action, azimsulfuron might have inhibited the acetolactate synthase enzyme, which is essential for synthesis of branched chain amino acids viz., valine,

leucine, isoleucine, which in turn inhibited the cell division and growth of the target weeds. Similar findings were reported by Pratap Singh *et al.*⁷.

Treatments	Weed density (No./m ²)		Weed dry matter (g/ m ²)		Grain yield (t/ha)	Straw yield (t/ha)	Harvest Index (%)
	20 DAT	40 DAT	20 DAT	40 DAT			
Oxyflourfen @ 0.1 kg/ha as PE	7.80 (60.33)	12.63 (159.10)	2.73 (6.98)	7.09 (49.75)	2.13	2.98	41.70
Oxadiargyl @ 75 g/ha as PE	10.56 (111.10)	12.97 (167.75)	3.97 (15.28)	7.41 (54.37)	2.12	2.96	41.77
Oxyflourfen @ 0.1 kg/ha as PE fb HW at 20 DAT	7.62 (57.61)	4.37 (18.64)	2.72 (6.91)	2.68 (6.68)	3.19	4.23	42.99
Oxadiargyl fb HW at 20 DAT Oxyflourfen fb azimsulfuron	10.84 (116.98)	5.07 (25.21)	3.99 (15.42)	3.14 (9.39)	2.47	3.56	41.03
@ 20 g/ ha at 20 DAT	7.77 (59.88)	4.16 (16.8)	2.74 (7.01)	2.56 (6.06)	3.38	4.24	44.37
Oxadiargyl fb azimsulfuron @ 20 g/ha at 20 DAT	10.62 (112.33)	8.04 (64.21)	4.02 (15.65)	4.17 (16.85)	2.47	3.56	40.97
Oxyflourfen fb chlorimuron-ethyl @ 5 g/ha at 20 DAT	7.66 (58.20)	4.99 (24.39)	2.73 (6.97)	3.07 (8.94)	2.83	3.77	42.87
Oxadiargyl fb chlorimuron-ethyl @ 5 g/ha at 20 DAT	10.73 (114.53)	8.4 (70.14)	4.00 (15.51)	4.17 (16.92)	2.48	3.56	41.04
HW twice at 20 and 40 DAT	15.43 (237.65)	4.53 (19.99)	5.22 (26.70)	2.80 (7.34)	2.83 -	3.77	42.86
Unweeded check (Control)	15.54 (241.12)	16.76 (280.50)	5.23 (26.82)	9.51 (89.95)	1.78	2.66	40.04
S.Em ±	0.696	0.516	0.113	0.278	0.114	0.130	-
CD (P = 0.05)	2.07	1.53	0.33	0.82	0.340	0.387	-

Data subjected to square root transformation $Vx + 0.5$. Values in parentheses are original.

RESULTS AND DISCUSSION

Taller plants were observed with PE application of oxyflourfen in combination with azimsulfuron (T₅) or HW at 20 DAT (T₃). This is attributed to lesser weed infestation as evident from lower weed dry matter under these treatments.

Higher values of LAI with PE application of oxyflourfen fb azimsulfuron applied at 20 DAT and PE application of oxyflourfen fb HW at 20 DAT might be attributed to the satisfactory control of weeds during the vegetative growth period and provided conducive conditions for efficient utilization of light, space, moisture and nutrients, which in turn improved the leaf number as well as size. The lowest LAI with unweeded check might be due to competition exerted by weeds for growth factors throughout the crop growth period, which resulted in smaller size of leaves. The highest

number of productive tillers/m² and dry matter accrual of finger millet were recorded with PE application of oxyflourfen fb azimsulfuron applied at 20 DAT, which maintained parity with PE application of oxyflourfen fb HW at 20 DAT. The reduced competition from weeds and increased availability of resources like nutrients, soil moisture and light, paved the way for improvement of crop stature as reflected by taller plants and higher leaf area index, which consequently increased the dry matter of the crop as was also reported by Kumara *et al.*⁴.

Yield and yield attributes

Grain yield and straw yield were higher with PE application of oxyflourfen fb azimsulfuron applied at 20 DAT. This is attributed to cumulative effect of vegetative growth stature and the yield components viz., productive tillers/ m², number of fingers/ear, ear weight including higher thousand grain weight. These

results corroborate with the findings of Adikant Pradhan *et al.*¹. The next best weed management practice was HW twice at 20 and 40 DAT, which was statistically similar to PE application of oxyflourfen fb chlorimuron-ethyl applied at 20 DAT. A yield reduction (weed index) to a tune of 47% was observed with unweeded check compared to PE application of oxyflourfen fb azimsulfuron applied at 20 DAT.

CONCLUSION

It was concluded that PE application of oxyflourfen @ 0.1 kg/ha at 3 DAT fb PoE application of azimsulfuron @ 20 g/ha or HW at 20 DAT was proved to be the best practice for effective weed suppression and to obtain high yield in transplanted finger millet.

REFERENCES

1. Pradhan, A., Rajput, A. S. and Thakur, A., Effect of weed management on growth and yield of finger millet. *Indian Journal of Weed Science*, **42(1&2)**: 53-56 (2010).
2. Dass, A., Sudhishri, S. and Lenka, N. K., Integrety nutrient management to improve fingermillet productivity and soil conditions in hilly region of eastern India. *J. Crop Improve.* **27**: 528-546 (2013).
3. Guruprasanna, H. L., Prabhakara Setty, T. K. and Nanjappa, H. V., Efficiency of chlorimuron ethyl in control of weeds in transplanted finger millet. *Mysore Journal of Agricultural Sciences*, **38(3)**: 289-293 (2004).
4. Kumara, O., Basavaraj Naik, T. and Palaiah, P., Effect of weed management practices and fertility levels on growth and yield parameters in finger millet. *Karnataka Journal of Agricultural Sciences*, **20(2)**: 230-233 (2007).
5. Ministry of Agriculture Government of India, www.indiastat.com (2012).
6. Morishima, Y., Osabe, H. and Goto, Y., Action mechanism of DLH-1777, a novel 4-pyridine-3-carboxamide herbicide: peroxi- dising activity and accumulation of porphyrins. *Journal of Pesticide Science*, **15**: 553- 559 (1990).
7. Pratap Singh, V., Singh, S. P., Dhayani, V. C., Tripathi, N., Kumar, A. and Singh, M. K., Bioefficacy of azimsulfuron against sedges in direct seeded rice. *Indian Journal of Weed Science*, **41(1&2)**: 96-99 (2009).
8. Ramachandra Prasad, T. V., Narasimha, N., Dwarakanath, N., Munegowda, M. K. and Krishnamurthy, K., Integrated weed management in drilled finger millet. *Mysore Journal of Agricultural Sciences*, **25**: 13-19 (1991).