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Studies on Chemical Weed Control in Relation to Irrigation Levels in Finger Millet (*Eleusine coracana* Gaertn.)

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ABSTRACT

Simazine and atrazine were more efficient but not selective on ragi. Nitrofen was the most selective pre-emergence herbicide for the crop at 0.5kg a. i./ha and it also recorded the maximum profit. 2, 4-D was useful as a post-emergence herbicide. Different moisture regimes had no influence on the various yield attributes and yield in the first year. All the moisture levels influenced the grain yields independently, since the crop was raised in the rainless summer season.

INTRODUCTION

Finger millet or ragi (*Eleusine coracana* Gaertn.) is cultivated in Tamil Nadu in an area of 129.2 thousand ha. As one of the millet crops, receives adequate fertilization and irrigation which are complimenting the weed competition with the crop. Effective weed control is needed for the accomplishment of higher yields. There is the possibility of economising the water requirement, under the weed free environment by avoiding the weed competition for moisture. Studies were directed to evolve suitable chemical weed control method. Naidu and Singh (1958) found that hand weeding was useful to control weeds in finger millet. Patro and Das (1972) reported that Stam F-34 was the effective herbicide to control weeds and gave maximum grain yield in finger millet in combination with one weeding. Promising results were obtained with pre-emergence buturon, post-emergence MCPA, propanil and 2, 4-D in this crop (Kasasian, 1971). Thangavel (1973) found that, 2, 4-D was the useful herbicide for finger millet where *Solanum elaeagnifolium* formed the main constituent of weed flora. The aim of the present investigation was to fix the suitable herbicide and economic optimum level and to study the effect of different irrigation levels under different weed control methods.

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MATERIALS AND METHODS

Field experiments were conducted in the Tamil Nadu Agricultural University, Coimbatore during *kharif*, 1971 and summer, 1972 to find out the suitable herbicide for effective weed control in Co. 7 finger millet. The experiment was laid out in split plot design. There were three irrigation levels namely, irrigation at 50, 60 and 70 per cent available moisture which

TABLE 1. Effect of different methods of weed control in finger millet and their comparative economics

Treatments	1971						
	Weed population per sq.m. 30th day (No)	Dry matter of weeds per sq. m. (g)	Weed population per sq. m. 60th day (No)	Grain yield per ha (kg)	Increased income over hand weeding (Rs)		* Additional income over hand weeding (Rs)
Simazine 0.5 kg a. i./ha	228	225.2	140	2171	—	54.00	—
,, 1.0 ,,	116	278.2	168	1665	—	84.00	—
,, 1.5 ,,	120	276.4	168	1610	—	114.00	—
Atrazine 0.5 ,,	188	240 0	128	2208	—	74.00	—
,, 1.0 ,,	204	200.0	160	1420	—	124.00	—
,, 1.5 ,,	108	110.7	132	1467	—	174.00	—
Nitrofen 0.5 ,,	632	85.0	96	3741	162.50	64.00	222.00
,, 1.0 ,,	676	130.0	132	3415	−00.50	104.00	83.00
,, 1.5 ,,	580	151.0	144	3251	—	144.00	—
2, 4—D 1.5 ,,	648	170.1	136	3376	—	61.00	—
Hand weeding	420	125.2	72	3416	—	187.50	—
Control	1460	360.0	328	2261	—	—	—
S. E.	62.56	11.31	26.04	28.3			
C. D. (P=0.05)	176.00	31.89	76.00	80.0			

* Includes the saving in the cost of weeding over hand weeding

Table 1 [continued]

Treatments	1972						
	Weed population per sq m. 30th day [No]	Dry matter of weeds per sq. m. [g]	Weed population per sq. m. 60th days [No]	Grain yield per ha [kg]	Increased income over hand weeding [Rs.]	Cost of weed control per ha [Rs.]	* Additional income over hand weeding [Rs.]
Simazine 0.5 kg a. i./ha	212	240.9	217	2167	—	54.00	...
,, 1.0 ,,	88	281.1	101	1626	—	84.00	—
,, 1.5 ,,	133	297.2	136	1597	—	114.00	—
Atrazine 0.5 ,,	141	241.9	149	2216	—	74.00	—
,, 1.0 ,,	120	211.1	126	1423	—	124.00	—
,, 1.5 ,,	111	95.6	117	1476	—	174.00	—
Nitrofen 0.5 ,,	108	101.2	119	3743	169.50	64.00	238.50
,, 1.0 ,,	111	127.4	123	3411	3.50	104.00	87.00
,, 1.5 ,,	132	153.3	144	3249	—	144.00	—
2, 4—D 1.5 ,,	107	173.4	115	3304	—	61.00	—
Hand weeding	60	130.1	69	3404	—	187.50	—
Control	271	374.3	310	2239	—	—	—
S. E.	6.52	9.02	17.00	32.2			
C. D. [P=0.5]	46.80	25.50	48.00	91.00			

* Includes the saving in the cost of weeding over hand weeding

were allotted to the main plots. Twelve sub-plot treatments included were: pre-emergence application of simazine at 0.5, 1.0 and 1.5 kg a.i/ha; atrazine and nitrofen each at 0.5, 1.0 and 1.5 kg a.i/ha; post-emergence application of 2, 4-D sodium salt at 1.5 kg a.i./ha; hand weeding at 20 and 35 days (Farmers method) and unweeded control. As basal dose N, P_2O_5 and K_2O were

TABLE 2. Effect of irrigation levels on weeds and crop

Treatments	Mean weed population at the 30th day in 1971 No per sq.m	Mean grain yield in 1972 (kg per ha)
Irrigation at 50 per cent available moisture	96	2517
Irrigation at 60 per cent available moisture	125	2458
Irrigation at 70 per cent available moisture	116	2489
S. E.	3 92	6.6
C. D. [P = 0.05]	15	26

applied at 45, 45 and 22.5 kg per ha respectively. A top dressing of 45 kg of N per ha was given on 30th day after transplanting Herbicides of calculated quantity were mixed and sprayed in 600 litres of water per ha as per different treatments.

RESULTS AND DISCUSSION

The major weed flora in the experimental plots were *Trianthema portulacastrum* Linn., *Legasca mollis* Cav. and *Gynandropsis pentaphylla* DC. under dicots and *Cynodon dactylon* Pers. and *Cyperus rotunds* Linn. under monocots, *Trianthema portulacastrum* Linn. was the main weed species occupying nearly 90 per cent of the total weed population.

The data on weed population at different stages of crop growth indicated that the control recorded the maximum compared to other treatments. Application of simazine and atrazine resulted in minimum weed density, however, found to be harmful to the crop.

The results on the dry matter production of weeds showed that it was significantly varying due to different treatments. Control registered the maximum quantity of dry matter and the treatment receiving nitrofen at 0.5 kg recorded the minimum quantity in the first year and the same trend was maintained in the second year also. This treatment was on a par with the treatment of atrazine at 1.5 kg, which did not have the selectivity for ragi crop. The low dry matter production in the nitrofen treatments is probably due to the efficient weed control and the weed free environment resulted.

The results on the grain yield of finger millet revealed that it was significantly influenced due to different her-

bicide treatments in both the years (Table 1). Pre-emergence application of nitrofen at the rate of 0.5 kg resulted in significantly superior yields, followed by 1.0 kg and 1.5 kg of nitrofen. The treatment of 2, 4-D at 1.5 kg was ranking fourth with reference to yield. Various levels of simazine gave lower yields in all the years. The higher yields obtained with the minimum dose of nitrofen is attributed to the efficient weed control of dicotyledonous weed species under the conditions of the experiments and thereby the weed free environment in the initial stages of the crop growth. It has been brought out that the yield could be significantly increased with the pre-emergence application of nitrofen due to its selectivity on finger millet. The increase in the dose of nitrofen beyond 0.5 kg has not significantly influenced the yield. However, it was not harmful to the crop, indicating the possibility for a wider range of dose. Post-emergence 2, 4 - D was found to be an useful herbicide at 1.5 kg dosage.

The result on the levels on irrigation (at 50, 60 and 70 per cent available moisture) revealed that irrigation levels failed to attain statistical significance with reference to various yield attributes and yield for the first year except the weed count on the 30th day (Table 2). The irrigation at 50 per cent available moisture gave significantly lower weed population compared to irrigation at higher moisture levels. In the second year, irrigation treatments significantly influenced the grain yield (Table 2). Irrigation at higher moisture status resulted in significantly higher yields and all the treatments were independently influencing the yield. The significant effect of irrigation levels in the second year may be attributed to the fact that the crop was under the lowest rainfall of 201.7 mm spreading over to 4 rainy days in summer season. The first year investigation was taken up in the monson season in which the crop received a rainfall of 410.8 mm with 23 rainy days during the crop growth. Irrigation at 50 per cent of available moisture was seemed to be optimum for the monsoon season but irrigation at 70 per cent of available moisture was useful in the summer season.

The economics on the chemical weed control indicates that highest net profit (Rs. 222 to 239) was realized with the application of 0.5 kg a.i per ha of nitrofen. The treatment of 1.0 kg a.i per ha of nitrofen though not resulted in additional yield over hand weeding, there was a saving in the cost of weed control (Rs. 83.50). Comparatively lesser cost of weed control coupled with higher grain yields in the case of nitrofen at 0.5 kg is the reason for the higher additional income obtained. The cost of weed control

with post-emergence application of 2, 4 - D is comparable with the optimum dose of nitrofen. But the grain yield was low due to the fact that there was weed competition in the early stage before the post-emergence application of 2, 4-D. However, 2, 4-D was seen as one of the selective herbicides and an alternative choice for weed control in finger millet. This finding falls in line with Krishnamurthy (1969) and Kasasian (1971), that 2, 4-D was a promising herbicide for this crop.

REFERENCES

KASASIAN L. 1971. *Weed control in tropics.* Leonard Hill London, pp. 281–2.

KRISHNAMURTHY, K. 1969. Effect of weedicides on weeds and grain yield of finger millet. *Mysore J. agric. Sci.* 3 : 341–3.

NAIDU, B. A. and D. J. C. SINGH, 1958. Studies on the effect of 2, 4-D, MCPA on ragi crop (*Eleusine coracana* Gaertn.) and weeds. *J. Indian Bot. Soc.* 37 : 343 - 52.

PATRO, G. K. and R. C. Das, 1972. A note on the performance of Stam F-34, Ansar-529 and MCPA on control of weeds in ragi (*Eleusine coracana* Gaertn.). *Indian J. Weed Sci.* : 69 – 72.

THANGAVEL, S. 1973. *Selectivity and residual toxicity of different weed control methods in ragi (Var. No. 7) on the control of white horsenettle* (Solanum elaeagnifolium Cav.) Diss. M. Sc. (Ag.). Tamil Nadu Agricultural University.