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CHEMICAL WEED CONTROL AND ITS ECONOMICS IN TRANSPLANT FINGERMILLET*

H. V. NANJAPPA[1] and M. M. HOSMANI[2]

In the experiment conducted during 1977 and 1978 at Agronomy field, Main Research Station, University of Agricultural Sciences, Bangalore, the herbicides treatments were pre-emergence application of 2, 4-D at 0.5 kg a i/ha, neburon at 0.5 and 1.0 kg a. i/ha, nitrofen at 0.5 kg a.i/ha and post-emergence application of 2, 4-D at 0.5 kg a i/ha, neburon at 0.5 and 1.0 kg ai/ha, propanil at 1 kg ai/ha, along with weed free (hand weeding at 20, 35 and 50 days after transplanting) and an unweeded control. Weed free treatment gave the highest grain yield (3807 kg/ha in 1977 and 3263 kg/ha in 1978). Among the herbicides, pre-emergence application of neburon at 1 kg ai/ha gave the highest grain of 3300 kg/ha in 1977 and 2800 kg/ha in 1978 and it was on par with post-emergence application of 2, 4-D at 0.5 kg ai/ha and pre-emergence application of neburon at 0.5 kg ai/ha. Similar trend was observed in case of straw yield also. In the year 1977, highest net profit was in weed free Rs. 1885/ha followed by post-emergence application of 2, 4-D at 0.5 kg ai/ha (Rs. 1474/ha), pre-emergence application of neburon 0.5 kg ai/ha (Rs. 1467/ha) and at 1.0 kg ai/ha (Rs. 1467/ha). During 1978, the highest net profit was again in weed free treatment (Rs. 1448/ha), followed by pre-emergnece application of neburon 0.5 and 1.0 kg ai/ha, and post emergence application of 2, 4-D at 0.5 kg ai/ha.

The age old practice of weed control in fingermillet such as hand weeding is tedious, time consuming and accomplished by using a large amount of expensive labour. This and urge towards the scientific farming during recent years emphasise the need for chemical weed control in this crop. Krishnamurthy (1969) reported that preplant application of 2, 4-D at 0.5 kg ai/ha was superior to simazine and EPTC application. Field trials conducted at Trinidad have indicated pre-emergence application of neburon was effective in controlling weeds in fingermillet (Anon. 1968). Chandrasingh and Narayana Rao (1971) reported 2, 4-D at 5.6 kg/ha has given the best weed control in transplanted fingermillet. Patro and Das (1972) from Orissa reported that application of Propanil 15 days after planting at 2.24 kg ai/ha gave better weed control and grain yield, while Subbaiah *et al.* (1974) opined that 2, 4-D Na salt 1.5 kg/ha post-emergence spray gave good control of weeds. With this background, investigations were conducted to find out suitable herbicides for effective weed control in transplanted fingermillet.

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& 2 Junior Agronomist, AICARP, UAS, GKVK Campus, Bangalore-560065 and Associate Professor of Agronomy, Agricultural College, Dharwad-580005, respectively.

MATERIALS AND METHODS

This experiment was conducted during 1977 and 1978 at Agronomy field unit, Main Research Station, University of Agricultural Sciences. Bangalore. The soils where this investigation was carried out is sandy loam in texture having 56 to 58 per cent sand, 31 to 36 per cent silt and 8 to 11 per cent clay with a pH of 5.5 to 6.3. The soils are moderately fertile with low available P_2O_5 (0.006 to 0.008 per cent) as compared to available N (0.0114 to 0.0117 per cent) and available K_2O (0.0024 to 0.003 per cent). The electrical conductivity was low 0.26 to 0 28 m.m.hos/cm, which indicated that there were no salinity hazards in the soils. The treatments consisted of pre emergence application of 2, 4-D @ 0.5 kg ai/ha, neburon @ 0.5 and 1.0 kg ai/ha, nitrofen @ 0.5 kg ai/ha, post emergence application of 2, 4-D @ 0.5 kg ai/ha. neburon @ 0 5 kg ai/ha and 1.0 ai/ha, propanil @ 1 kg ai/ha. In addition hand weeding and unweeded control were included for comparison. These 10 treatments were arranged in a Randomised Block Design replicated three times with a plot size of 4.5m x 3.0m. Two seedlings per hill of PR-202 fingermillet variety were transplanted with 22 5 cm spacing between rows and 10 cms between plants on 26-6-1977 during 1977 and on 10-3 1978 during 1978. At the time of planting, fertilizers were applied at the rate of 100 : 50 : 50 kg N, P_2O_5 and K_2O/ha. Pre-emergence application of herbicides were made one day after planting and post-emergence application of herbicides were made 10 days after planting, with the help of a hand operated Knapsak sprayer. The calculated quantity of herbicides were mixed with water at the rate of 800 L/ha. There was sufficient soil moisture at the time of planting and also at the time of herbicide application. Later on the crop was irrigated once in a week till the crop was attaining maturity.

Observations on monocot and dicot weeds were recorded (from 0.5 m^2 area which was permanently marked in the net plot), at 40 days after transplanting and at harvest. The dry weight of weeds was recorded (from part of the net plot which was marked for dry matter sampling of weeds) at harvest. The data on weed count and dry weight of weeds showed a high variation. Therefore, square transformation ($\sqrt{x + 0.5}$) was adopted before the data was statistically analysed. Biometric observations on grain and straw yield, yield components were statistically analysed by following the procedure given by Panse and Sukhatme (1967) and the results have been discussed at the probability level of 5 per cent.

RESULTS AND DISCUSSION

Important grassy weed species observed in the experimental plots consisted of *Dactyloctenium aegyptium, Dicanthium annulatum, Dicanthiumcaricosum*. The broad leaved weeds were *Bidens pilosa, Euphorbia hirta, Leucas aspera, Portulaca oleracea, Tridax procumbens, Phyllanthus niruri* and *Accan-*

Table-1 : Grain yield, straw yield and Economics as affected by weed control treatments in transplanted fingermillet.

Treatments kg ai/ha	1977						1978					
	Grain yield kg/ha	Straw yield kg/ha	Gross income Rs./ha	Cost of weed control Rs./ha.	Total cost of weed control Rs./ha.	Net returns Rs./ha.	Grain yield kg/ha	Straw yield kg/ha.	Gross income Rs /ha.	Cost of weed control Rs./ha.	Total cost of weed control Rs /ha.	Net returns Rs./ha.
2 4-D 0 5 kg pre em. application	2916	4350	2711	78	1553	1158	2375	3433	2206	78	1503	703
2, 4-D 0 5 kg post em. application	3259	4766	3027	78	1553	1474	2666	3966	2479	78	1503	976
Neburon 0.5 kg pre em application	3233	4783	3005	63	1538	1467	2733	3966	2539	63	1488	1051
Neburon 1 kg pre em application	3300	4875	3067	125	1600	1467	2800	3991	2600	125	1550	1050
Neburon 0,5 kg post em. application	2716	4016	2524	63	1538	986	2116	3000	1964	63	1488	476
Neburon 1 kg post em application	2633	4100	2451	125	1600	851	2650	3016	2445	125	1550	895
Propanil 1 kg post em. application	2633	3766	2444	175	1650	794	2033	3041	1891	175	1600	291
Nitrofen 0.5 kg pre em. application	2950	4100	2737	72	1547	1190	2100	3060	1951	72	1497	454
Weed free (3 Hand weeding)	3807	5738	3540	180	1655	1885	3283	4916	3053	180	1605	1448
Un-weeded control	2455	3456	2278	—	1475	803	1850	2833	1722	—	1425	297
C.D. at 5%	137.45	102.32	—	—	—	—	72.59	116.96	—	—	—	—

Note : Grain cost Rs. 90/q. straw cost Rs. 20/q tonne; labour cost Rs. 4/women. 2, 4-D WP Rs. 26/kg; Neburon Rs. 100kg/ propanil Rs. 58.61/litre; Nitrofen Rs. 36/litre.

thospermum hispidum. Nearly 75 per cent of total weed population was coustituted of monocot weeds and the remaining was dicot weeds. The predominant grassy weeds were *Dicanthium annulatum* and *Dactyloctenium aegyptium* and the predominant broad leaved weeds were *Phyllanthus niruri*, *Bidens pilosa*, and *Portulaca oleracea*.

Grain yield was maximum in weed free treatment (3807 kg/ha in 1977 and 3283 kg/ha in 1978). Among the herbicides, neburon at 1.0 kg ai/ha pre-emergence application and post-emergence application of 2, 4-D at 0.5 kg ai/ha were the best. No competition or less competition right from the early stages enabled the crop to establish well in these treatments. The effectiveness of neburon in controlling the weeds in fingermillet was reported from trinidad (Anon, 1968). Further, higher grain yield with pre-plant application of 2 4-D (Krishnamurthy, 1969) and post-emergence application of 2, 4 D at 1.5 to 5 kg 10 days after planting gave good control of weeds (Chandrasingh and Narayana Rao, 1971); and Subbaiah *et al* (1974) yield reduction upto 48 per cent was observed in the unweeded control as compared to weed free treatment. Similar reduction in grain yield has been reported by Sundaresh *et al.* (1975). Similar trend has been observed in case of straw yield also, The differences in the grain and straw yield was the consequence of yield components. Among the yield components, productive tillers were more in post-emergence application of neburon at 0.5 kg ai/ha and 2, 4-D at 0.5 kg ai/ha. These results are in line with that of Chandrasingh and Narayana Rao (1971).

Grain weight per earhead, grain number per finger and 1000 grain weight were more in weed free treatment as well as in pre-emergence application of neburon at 1 kg ai/ha post-emergence application of neburon at 0.5 kg ai/ha and 2, 4-D at 0.5 kg ai/ha (Table-2). These results are in line with that of Chandrasingh and Narayana Rao (1971).

There were significant differences in the dry weight of weeds. Application of herbicides reduced the dry weight of weeds signficantly. The reduction in dry weight of weeds was the consequence of reduction in monocot and dicot weed population (Table-3). Among the herbicides, neburon at 1 kg ai/ha as pre emergence application, neburon at 0.5 ai/ha have accorded the lowest dry weight as they were more effective both on monocot and dicot weeds. Post-emergence application of 2, 4-D has also resulted in lower dry weight of weeds mainly due to its effect on dicot weeds and to some extent on monocot grassy weeds.

Maximum net profit was realised in the weed free treatment where the crop was hand weeded three times after transplanting (Table-1). Next best was 2, 4-D at 0.5 kg ai/ha post emergence application, neburon at

Table 2 : Yield components as affected by weed control treatment in transplanted fingermillet.

Treatments (kg ai / ha)	1977				1978			
	Productive tiller / hill	Grain weight per ear-head (g)	Grain number per finger	1000 grain weight (g)	Productive tiller / hill	Grain weight per ear-head (g)	Grain number per finger	1000 grain weight (g)
2, 4-D 0.5 kg pre em application	6 00	3 33	362	3,228	3.66	3 36	361	3.216
2, 4-D 0 5 kg post em. application	5.96	3.60	382	3,240	4.66	3.50	371	3.177
Neburon 0 5 kg pre em. application	5.90	3.60	374	3.236	4.66	3,46	364	3.167
Neburon 1 kg pre em. application	6.10	3.66	381	3.246	4 66	3.60	373	3.250
Neburon 0 5 kg post em: application	5 00	3.27	370	3.236	4.00	3.33	361	3.220
Neburon 1 kg post em. application	4.33	3.33	364	3.233	3.33	3.36	367	3.200
Fropanil 1 kg post em. application	4.00	3.47	362	3.243	3.00	3.33	346	3.066
Nitrofen 0 5 kg pre em. applicaiton	5.00	3.53	373	3 235	4 00	3.43	362	3 133
Weed free (3 Hand weeding)	6.43	3.70	408	3.266	6 00	3 66	374	3.348
Un-weeded control	3.33	3.37	338	3 188	2.66	3.36	337	3 200
C. D. at 5%	0.825	0.231	11.03	NS	1.071	0.168	14.31	NS

Table 3 : Monocot and dicot weed population (0.5 M² area) and weed weight as affected by weed control treatments in transplanted fingermillet.

Treatments kg ai/ha.	1977				1978				Total dry weight of weeds at harvest (kg/ha)	
	Monocots		Dicots		Monocots		Dicots			
	40th day	At harvest	40th day	At harvest	40th day	At harvest	40th day	At harvest	1977	1978
2 4-D 0.5 kg pre em. application	5.08 (25)	5.05 (25)	1.50 (2)	1.50 (2)	5.40 (28.6)	5 40 (28.6)	1.34 (1.6)	1.5 (2)	1350	1500
2, 4-D 0.5 kg post em. application	4.80 (22)	5.05 (25)	1.46 (1.6)	1.87 (3.0)	5.01 ((24.6)	5.27 (27.3)	1.50 (2)	1.87 (3)	1066	1266
Neburon 0.5 kg pre em. application	3 57 (12)	3 82 (14)	1.34 (1.3)	1.71 (2.6)	3.93 (14.1)	3.36 (11.3)	1.50 (2)	1.87 (3)	1350	1333
Neburon 1 kg pre em. application	3.88 (14)	3.69 (13)	1 34 (1.3)	1.71 (2.6)	4.00 (12.3)	2.79 (7.6)	1.34 (1.6)	1.5 (2)	1133	1100
Neburon 0.5 kg. post em. application	4.63 (21)	4.10 (16)	1.31 (1.3)	5.50 (2.0)	3·98 (15 3)	3 08 (5)	1.34 (1.6)	1.71 (2.6)	1400	1266
Neburon 1 kg post em. application	4.63 (21)	4 29 (18)	1.67 (2.1)	1.50 (2.0)	4.41 (19)	4.09 (16)	1.34 (1.6)	1.87 (3)	1366	1366
Propanil 1 kg post em applicatior	4.74 (22)	4.47 (22)	1.67 (2.1)	1.50 (2.0)	4.37 (18.6)	4.87 (23.3)	1.95 (3 3)	1.5 (2)	1900	1750
Nitrofen 0.5 kg pre em. application	4.22 (14)	4.52 (20)	1.67 (2.1)	1.71 (2.6)	4 60 (20 6)	4.25 (17.6)	2.11 (4)	1 73 (2.6)	1550	1533
Weed free (3 Hand weeding)	0.87 (0.33)	1.22 (1)	0.71 (0.00)	1.22 (1.0)	0.88 (0.3)	1 34 (1.3)	0.88 (0.3)	1.28 (1.3)	43	52
Un-weeded control	5.33 (28)	6.03 (36)	2.67 (6 6)	2.58 (6.1)	5.52 (30)	6.04 (36)	3 24 (10)	3.02 (8.6)	2783	2733
C. D. at 5%	0.441	).565	0.345	0.441	0.414	0.645	0.363	0.475	119.39	268.36

Note : Figures in the parenthesis refers to original data.

0.5 and 1.0 kg ai/ha as pre-emergence application. Although hand weeded treatment gave highest net profit, it may not be possible to carry out the operation because of labour scarcity. Thus, herbicides can be used for effective weed control and to get higher net profit where the labour availability is scarce.

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