

Differential Effect of Herbicides in Summer and Monsoon Cowpea (*Vigna sinensis* L. Savi)

By

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ABSTRACT

Pre-emergence application of prometryne at 1.0 kg a. i./ha and terbutryn at 0.75 kg a. i./ha gave prolonged weed control than alachlor and nitrofen at 1.5 kg a. i./ha, in Co. 2 Cowpea and were economical than hand weeding. Pre-emergence application of either prometryne or terbutryn with one late manual weeding was sufficient for controlling weeds till crop maturity. Receipt of monsoon rain after spraying the triazine herbicides caused high seedling mortality due to their high solubility.

INTRODUCTION

The pre-emergence or presown application of herbicides namely trifluralin, diphenamid, chlorpropham, chloramben and dacthal were effective (Burgis, 1963; Johnson and Amling, 1964; Aryeetey, 1970). Saroha and Gupta (1973) reported a dose of 0.5 kg/ha as the upper tolerance limit of alachlor and nitrofen for cowpea in clay loam soil with organic matter 0.75 per cent and pH 8.4. In Tamil Nadu, pre-emergence application of either terbutryn 0.75 kg a. i./ha or prometryne 1.0 kg a. i./ha followed by one late weeding in each case was effective and economical (Mohamed Ali et al. 1974). In line with this, further investigations were carried out and the results are reported here.

MATERIALS AND METHODS

The experiments were conducted in Co. 2 cowpea during 1973-'75 both under irrigated and rainfed

conditions. The soil type was black clay loam with pH 7.9. The nutrient status of the soil was low in N, medium in P and high in K. The experiment with the monsoon crop was conducted in randomised block design with three replications. Seeds were sown in 12.5 m² plots and the herbicides were sprayed after sowing. Due to heavy infestation of weeds one hand hoeing and weeding was given to alachlor, nitrofen, terbutryn and prometryne plots. The treatments, weed count and weight, and grain yield recorded are given in the Table. The summer irrigated crops sown with a spacing of 45 x 20 cm in 1975. The treatments were:— (1) unweeded control in 1974, and one hand weeded control in 1975, (2) Manual weeding twice (20th and 40th day), and (3) four pre-emergence herbicides each at three doses sprayed two days after first irrigation followed by life irrigation on fifth day (Table).

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TABLE. Effect of herbicides on weed control, crop growth and yield of Cowpea

Treatment	(monsoon) 1973					1974					1975		
	Germi- nation	Seed yield Kg/ha	Fresh weed weight kg/m ²	No. of leaves per plant	Plant height in cm	No. of pods per plant	Plant weight at harvest Kg/ha	Seed yield Kg/ha	Weed count on 20 DAS No/m ²	Weight of weeds 50 DAS Kg/ha	Seed weight Kg/ha		
Control	84	291	1.18	3.7	11.3	1.2	809	43	217	15.33	591		
Hand weeding once	84	1107	1.16	7.0	20.3	18.0	3415	519	137	3.33	887		
Alachlor 1.0 kg a. i./ha	79	1040	0.76	6.7	20.3	14.0	4259	317	132	7.00	519		
-Do- 1.5 "	82	1110	0.40	5.7	12.0	15.0	4227	414	80	9.33	848		
-Do- 2.0 "	—	—	0.23	4.3	10.7	11.0	2698	394	91	5.00	482		
Nitrofen 1.0 "	—	—	1.46	4.3	12.3	12.0	3684	436	131	10.67	632		
-Do- 1.5 "	82	1374	1.46	4.7	14.0	12.0	2737	331	101	12.00	863		
-Do- 2.0 "	79	1407	0.94	6.3	16.0	12.0	3705	280	145	14.67	402		
Terbutryn 0.5 "	87	1131	0.54	5.7	15.0	13.0	2830	436	100	6.33	705		
-Do- 0.75 "	83	1160	0.35	5.3	12.0	11.0	2979	390	69	8.67	835		
-Do- 1.00 "	79	1125	0.26	3.3	9.3	8.0	1458	271	52	5.33	970		
Prometryne 0.5 "	80	985	—	—	—	—	—	—	—	—	—		
-Do- 0.75 "	—	—	0.24	4.7	12.0	14.0	2234	436	84	9.67	1040		
-Do- 1.00 "	76	1646	0.22	6.7	15.7	20.0	3294	623	91	3.33	824		
-Do- 1.25 "	—	—	0.13	5.0	11.0	7.0	1719	186	48	6.00	596		
C. D. (P = 0.05)	—	319	0.54	N. S.	5.9	2.3	N. S.	253	660	5.10	N. S.		

RESULTS AND DISCUSSION

The predominant weed in the experimental fields was *Trianthema portulacastrum* L. The other broad leaved weeds were *Gynandropsis pentaphylla* L.; *Amaranthus viridis* L., *Euphorbia hirta* L. and *Digera arvensis* L., The grass weeds like *Cyperus* sp., *Cynodon dactylon* L. and *Chloris barbata* were also present. In unweeded control there were 217 weeds in summer season whereas in monsoon there were 1168 numbers per m². The weed infestation was reduced due to application of herbicides from 145 to 48 in summer and 812 to 308 in monsoon. Dry matter production of weeds in unweeded control was 1.18 and 15.3 kg/m² as against 0.132 and 3.3 kg/m² on 20th and 50th day after sowing in herbicide treated plots. The loss due to weeds in grain cowpea was more than 80 per cent while losses upto 60 per cent have been reported in sorghum and cowpea mixtures by Dutta et al. (1972). Among the herbicides tried, dry matter production of weeds was less in terbutryn and prometryne. The monocot weed, *Cyperus* sp. was high in terbutryn and prometryne treated plots.

Germination count and crop stand: There were no differences between the treatments in germination in the irrigated crops of 1974 and 1975. In the rainfed crop of 1973, application of terbutryn at 1.0 kg and prometryne at 1.0 kg a. i./ha caused higher seedling mortality (Table). Subsequently, gap filling was made and population maintained. In the trail conducted in March 1973, severe seedling mortality was noticed in terbutryn at 0.75 to 1.0 kg

and nitrofen at 0.5 to 1.5 kg a. i./ha application and subsequently the trial was not taken up. The higher seedling mortality was due to high solubility of triazine herbicides on receipt of rains immediately after spraying herbicides. At higher doses of alachlor at 2.0 kg a. i. ha mottled and chlorotic leaves and reduced vigour were noticed. Terbutryn at 1.0 kg and prometryne at 1.25 kg a. i./ha showed phyto-toxic effect on number of leaves, branches and pods, plant height and weight (Table).

Seed yield: In irrigated crop of 1974, pre-emergence application of prometryne gave heighest yield but was on par with hand hoeing and weedings, terbutryn, alachlor and nitrofen application (Table). In 1975 also it gave higher yield (1040 kg/ha) and was followed by terbutryn, hand weedings, nitrofen and alachlor in that order. In rainfed cowpea also, prometryne gave maximum yield of 1646 kg followed by nitrofen. Thus, in all the crops prometryne was effective. Next to prometryne, the hand hoeing and weedings and other herbicides were effective.

In prometryne higher dose (1.25 kg) the yield was reduced due to higher mortality of seedlings, less number of leaves, pods, reduced plant height and weight (Table). Hence, prometryne at lower dose of 1.0 kg a. i./ha was optimum dose for this crop. Mez (1972) and Chisci (1963) found that prometryne application at the time of sowing was effective in vegetable cowpea and also in fodder cowpea with sorghum. Among the terbutryn

doses (0.5, 0.75 and 1.00 kg a. i./ha) yields were on par but marginal reduction in yield was noticed at the highest dose tried. Its phyto-toxic effect reflected on seedling establishment, number of leaves, pods, plant height and weight. Eventhough the yields with alachlor doses were on par, yet yield was reduced at 2 kg a. i./ha due to phytotoxic effect on plant characters. Hence, alachlor at 1.5 kg a. i./ha may be recommended for better weed control and yield. Similar trend was observed in nitrofen application. Talbert (1972) reported that alachlor at 2 kg and chloramben methyl ester 3 kg/ha were the best treatments in *Vigna unguiculata*. Due to degradation of herbicides after few weeks one late weeding was given for all the chemical treatments.

Economics of weeding: Economics of manual weeding and herbicide applications were worked out from the mean yield of four crops. Manual weeding twice with 280 man hours per weeding resulted in expenditure higher than chemical weeding. In chemical weeding application of prometryne and terbutryne reduced 40 per cent of weeding cost than manual weeding due to less chemical cost and their prolonged control of weeds resulting less requirement of man hours for late weeding. Pre-emergence application of alachlor and nitrofen at 1.5 kg a. i./ha is comparable with manual weeding in cost and yield.

Pre-emergence application of prometryne at 1.0 kg a. i./ha and terbutryne at 0.75 kg a. i./ha recorded more profit compared to manual weeding

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