

## Chemical Weed Control in Okra (*Abelmoschus esculentus*)

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The study on weed control methods in Okra revealed that the persistence among the three chemicals was in the order of nitrofen, alachlor, prometryne. The treatment receiving prometryne 0.5 kg a.i/ha plus one hand weeding recorded an yield of 16900 kg of fruits/ha followed by prometryne 1.0 kg a.i/ha (16792 kg), farmers method (16240 kg) and nitrofen 2.0 kg plus one hand weeding (16355 kg). Prometryne 0.5 kg a.i/ha ranked fifth with an yield of 15447 kg/ha. It is concluded that prometryne is the most economical and effective herbicide for Okra at a dose of 0.5 to 1.0 kg a.i/ha as pre-emergence application. Combination of a hand weeding along with prometryne is recommended in area where perennial weeds are also present. Till the availability of prometryne in the market farmers method of two hand weedings are recommended for the present.

Okra is an important vegetable crop of Tamil Nadu. Being a short duration vegetable crop, early weed free environment is important for higher yields in Okra. Two weedings are usually given to Okra on the first and second fortnight. In few regions the second weeding is given as digging with spade and earthing up of soils is made. Herbicides like trifluralin (Talbert, 1968; Dhuria *et al.*, 1974), diphenamid (Talbert, 1968) were found to be effective for Okra. Prometryne gave excellent weed control, when applied as pre-emergence herbicides (Kasasian, 1971). The effects of different weed control methods on Okra are discussed in this paper.

### MATERIAL AND METHODS

Field experiment was conducted during summer, 1976 under the All India

Co-ordinated Vegetable improvement Project of the Department of Horticulture, Tamil Nadu Agricultural University, Coimbatore. The soil type was red clay loam and the preliminary soil analysis is given in Table I.

#### Preliminary soil analysis

Field number	: 54 (Western Block)
pH	: 6.1
E.C.	: 0.5 millimhos/cm <sup>2</sup>
Available nitrogen	: 101.0 kg/ac (Low)
Available Phosphorus	: 6.0 kg/ac (Medium)
Available potassium	: 500.0 kg/ac (High)
Lime status	: Medium
Carbon (Organic)	: 0.75 per cent
E.C. of water	: 0.7 millimhos/cm

After thorough preparation of land, ridges and furrows were laid out 45 cm apart. Basal dose of NPK were applied at the rate of 45-148-180 kg NPK/ha on

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the sides of the ridges and covered before sowing the seeds. The seeds were sown on Feb., 76 with a spacing of 20 cm in the row. The variety included was Pusa Sawani. After germination two seedlings were maintained per hill. Half of the nitrogen was top dressed on the 30th day. Regular package of practices were adopted. Weed control treatments included were: alachlor (1.5, 2.0, 2.5 kg a.i./ha), nitrofen (2.0, 3.0 kg a.i./ha), prometryne (0.5, 1.0 kg a.i./ha), alachlor 1.5 kg a.i./ha + one hand weeding and Farmer's method of

two hoeing and weeding. An unweeded control was also included. All the herbicides were applied as pre-emergence application on the third day of sowing. Flat fan nozzle was used in a bak-pak sprayer for herbicide application which utilized a spray volume of 900 litres per ha. Weed and weed growth, yield attributes and yield of marketable pods were estimated.

RESULTS AND DISCUSSION

The main weed species found was *Trianthema portulacastrum*. Other

TABLE II. Effect of different weed control methods on the weed growth and weed dry matter production

Treatment	Weed count at different intervals (No. per m <sup>2</sup> )				Weed dry matter at different intervals (gm per m <sup>2</sup> )		
	2nd week *	4th week **	6th week	8th week	4th week	6th week	8th week
Lasso 1.5 lit a.i./ha	37(5.9)	45(6.3)	107(9.8)	71(8.4)	44.1(1.7)	246.4(2.2)	150.0(2.2)
.. 2.0 ..	42(6.2)	33(5.7)	72(8.3)	69(8.3)	31.0(1.6)	166.3(2.2)	188.7(2.3)
.. 2.5 ..	35(5.8)	29(4.5)	75(8.6)	70(8.4)	11.2(1.3)	96.2(2.0)	193.0(2.3)
Tok 2.0 ..	93(9.5)	53(7.2)	67(8.0)	81(9.6)	126.9(2.3)	291.6(2.4)	145.0(2.7)
.. 3.0 ..	49(6.9)	47(6.9)	63(7.8)	86(9.0)	47.2(1.7)	381.3(2.6)	126.7(2.1)
Prometryne							
.. 0.5 ..	48(6.9)	41(6.5)	61(7.8)	115(10.6)	22.7(1.4)	111.5(2.1)	145.3(2.2)
.. 1.0 kg ..	61(7.7)	31(5.6)	71(8.3)	91(9.6)	31.3(1.5)	138.4(2.2)	110.0(2.0)
Lasso 1.5 lit a.i./ha + one hand weeding	N. I.	N. I.	-(1.0)	-(1.0)	N. I.	-(1.0)	-(1.0)
Tok 2.0 .. + one hand weeding	N. I.	N. I.	-(1.0)	-(1.0)	N. I.	-(1.0)	-(1.0)
Prometryne 0.5 kg a i/ha + one hand weeding	N. I.	N. I.	-(1.0)	-(1.0)	N. I.	-(1.0)	-(1.0)
Hand weeding	N. I.	-(1.0)	-(1.0)	-(1.0)	-(1.0)	-(1.0)	-(1.0)
Control	327(17.6)	297(16.6)	165(12.8)	131(11.3)	401.5(2.6)	513.9(2.7)	344.0(2.5)
S. E.	1.969	1.718	0.981	0.868	0.141	0.122	0.091
C. D.	5.774	5.037	2.876	2.554	0.413	0.357	0.265

N. I. Hand weeding was not initiated

\* - Actual values

\*\* - Transformed values

weed species found were *Gynandropsis pentaphylla*, *Echinochloa* sp. *Cyperus rotundus* and *Cynodon dactylon* in the order of importance.

Weed count on various intervals are presented in Table II. The number of weeds was ranging from 37-93 per sq.m. for different herbicides treatment and the control recorded significantly higher weed number (327 per sq.m.). Similar trends were seen on the 4th week. There was not much difference among different herbicides treatments. Control registered higher weed number (297/sq.m.). There was no weeds in hand weeding (Farmer's method) treatment since hand hoeing and weeding were given on the 20th day. The treatments of chemical + one hand weeding was not taken for comparison since the hand weeding was given on the 30th day. The results

on the weed count on 6th week revealed that there was no significant difference between different levels of alachlor, nitrofen and prometryne. It was ranging from 71 to 107 per sq.m. The weed number was 165 per control. Farmers method and chemical plus hand weeding were free from weeds since weeding was given on the 30th day for these treatments. With reference to weed count on the eighth week similar trends were noticed as that of sixth week. The control was having 131 weeds per sq.m. The data on the weed dry matter production was recorded on fourth week (just prior to hand weeding due on the 30th day). The weed dry matter was ranging from 11.2 to 44.1 gm per sq.m., for alachlor. Nitrofen 3.0 kg a.i/ha recorded a dry matter of 47.2 gm per sq. m., compared to 126.9 gm for nitrofen 2.0 kg a.i/ha. Prometryne resulted in

TABLE III. Effect of different weed control methods on the yield, plant height and fruit characters

Treatment	Yield of fruits (kg per ha)	Weight of 10 fruits (gm)	Fruit length (cm)	Fruit girth (cm)	Plant height (cm)
Lasso 1.5 lit a.i per ha	11,077	215.0	16.4	6.8	113.6
Lasso 2.0 lit a.i per ha	10,580	203.3	15.6	6.6	105.5
Lasso 2.5 lit a.i per ha	10,407	183.3	14.6	6.2	91.2
Tox 2.0 lit a.i per ha	11,241	191.7	15.2	6.5	118.9
Tox 3.0 lit a.i per ha	12,982	218.5	16.3	6.5	122.5
Prometryne 0.5 kg a.i/ha	15,447	221.7	16.3	6.7	119.2
Prometryne 1.0 kg a.i/ha	16,792	250.0	17.5	6.9	130.2
Lasso 1.5 lit a.i/ha + one hand weeding	13,441	221.7	16.6	6.9	105.3
Tox 2.0 lit a.i/ha + one hand weeding	16,355	223.3	16.6	7.1	114.9
Prometryne 0.5 kg/ha + one hand weeding	16,900	201.7	15.9	6.9	113.3
Hand weeding	16,240	233.3	16.5	7.1	113.6
Control	3,377	151.7	13.9	5.2	87.3
S.E.	1,406	12.30			7.6
C.D.	4,357	36.10			72.0

significantly lower dry matter production of 22.7 gm (0.5 kg a.i) to 31.3 gm (1.0 kg a.i) per sq.m. It was interesting to note that the persistence of the chemicals was seen in the order of nitrofen, alachlor and prometryne. On the sixth week the dry matter production was significantly lower in the treatments of alachlor 2.5 kg a.i/ha (96.2 gm), prometryne 0.5 kg a.i/ha (111.5 gm) and prometryne 1.0 kg a.i/ha (138.4 gm). The treatments of chemical plus hand weeding was free from weeds due to the fact that weeding was given on the 30th day. On the 8th week there was little difference in weed dry matter among different chemicals. However control gave 344 gm of weed dry matter per sq.m. and there are no weed in farmer's method and chemicals plus hand weeding (Table III).

The results on the plant height at the final stage showed that control resulted in stunted growth with a plant height of 87.8 cm. The plant height was also in the decreasing trend in alachlor treated plots, which was clearly seen at the 2.5 kg a.i level with a plant height of 91.2 cm. The data on the weight 10 fruits showed that the control gave significantly lower fruit weight of 151.7 gm for 10 fruits and it was maximum for prometryne 1.0 kg a.i/ha (250.0 gm). It was ranging from 183.3 to 233.3 gm for other treatments. There was not much difference in the fruit length and girth for various treatments. The results on yield of fruits (Table III) out of five pickings revealed that prometryne 0.5 kg a.i/ha plus a hand weeding on the 30th day gave on yield of 16900 kg/ha closely

TABLE IV. Weed control trial on Okra - Economics

Treatment	Product kg per ha	Cost of weeding (Rs.)	Yield kg per ha	Cost of produce @ 40 paise/kg	Gross income (Rs.)	Income over hand weeding
Lasso 1.5 lit a.i per ha	3.000	125	11,077	4431	4306	-1790
Lasso 2.0 lit a.i per ha	4.000	165	10,580	4232	4057	-2039
Lasso 2.5 lit a.i per ha	5.000	200	10,407	4163	3963	-2133
Lasso 2.0 lit a.i per ha	8.000	320	11,241	4496	4176	-1920
Lasso 3.0 lit a.i per ha	12.000	480	12,982	5193	4683	-1413
Prometryne 0.5 kg a.i per ha	0.626	75	15,447	6179	6104	+ 8
Prometryne 1.0 kg a.i per ha	1.250	135	16,792	6717	6561	+ 486
Lasso 1.5 lit a.i per ha + one hand weeding	3.000	285	13,441	5376	5091	-1005
Tok 2.0 lit a.i per ha + one hand weeding	8.000	480	16,355	6542	6062	- 34
Prometryne 0.5 kg a.i per ha + one hand weeding	0.625	235	16,900	6760	6525	+ 429
Hand weeding	—	400	16,240	6496	6090	—
Control	—	—	3,377	1351	1351	-4745

<sup>a</sup>Cost of prometryne is considered on par with highly priced Atrazine at Rs. 120 per kg of a.i



followed by prometryne 1.0 kg a.i./ha (16792 kg), nitrofen 2.0 kg a.i./ha plus hand weeding (16355 kg) and farmers method (16240 kg). The farmer's method was found to be an effective method ranking after prometryne due to high density planting and vigorous growth of Okra by which the crop was able to compete with weeds. Prometryne 0.5 kg was ranking fifth (15447 kg) followed by alachlor 1.5 kg plus hand weeding (13441 kg) and nitrofen 3.0 kg a.i./ha (12932 kg). The yield for different levels of alachlor was ranging from 10407 to 11077 kg per ha. Control recorded significantly lower yield of 3377 kg fruits/ha. The higher fruit yield resulted by prometryne is attributed to the effective weed control resulted by prometryne. This finding falls in line with Kasasian (1967). Prometryne was possessing prolonged persistence compared to nitrofen and alachlor. Chemicals plus hand weeding treatments provided good weed control. The combination of a hand weeding with chemical methods on the 30th day warranted due to the presence of perennial weeds like *Cyperus rotundus* and *Cynodon dactylon* and the loss of persistence of chemicals. Alachlor was found to have moderate phytotoxicity on Okra plant which is evidenced from the set back of plants in the early stage and decrease in the plant height at the final stage. There was moderate incidence of yellow vein clearing disease at the fifth picking. It was observed that the incidence was uniform irrespective of the treatments.

The economics of different weed control methods showed that prometryne 1.0 kg a.i./ha resulted in a gross income of Rs. 6581 per ha and prometryne 0.5 kg a.i./ha plus a hand weeding on the 30th day gave a gross income of Rs. 6090/ha. and farmers method gave a gross income of Rs. 6090/ha. In other cases there is loss except prometryne 0.5 kg a.i./ha which was comparable with that of Farmers method. The loss in the income in the case of alachlor is due to low yield whereas in the case of nitrofen, it is due to high cost of the chemical. It is concluded that prometryne is the most economical and effective herbicide for Okra at a dose of 0.5 to 1.0 kg a.i./ha as pre-emergence application. Combination of a hand weeding along with prometryne is recommended in areas where perennial weeds are also present. Till the availability of prometryne in the market Farmers method of two hand weeding is recommended for the present.

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