Madras agric. J. 68 (9) : 607—612, September, 1981

Effect of Herbicides on Weed Growth, Growth and Yield in Groundnut, Bunch Cultivar POL.2.

R. KULANDAIVELU and Y. B. MORACHAN

An experiment was conducted under irrigated conditions to evaluate the effect of three herbicides viz., alachlor, nitrofen and penoxalin on weed growth and growth and yield components and pod yield of POL 2, a bunch groundnut cultivar. None of the herbicides proved superior to hand weeding in suppressing weed growth. While growth components like number of branches, root weight, and nodulation were unaffected, dry matter production registered an increase following herbicide application. Kernel weight or shelling percentage was not governed by herbicide but pod number increased under alachlor and nitrofen and decreased under penoxalin. Pod yield under the herbicides was comparable with that under hand-weeding. But from the standpoint of monetary returns, alachlor had a clear edge over either of the other two herbicides, or hand weeding and may therefore be safely recommended.

That yield depression in ground nut can be as high as fifty per cent depending upon weed density (Hauser *et al.*, 1973) highlights the vital role of weed control. In view of the peculiar growth habits of the crop, mechanical control of weeds has only limited success. To add to this, mounting cost and scarcity of labour prove further deterrents to the traditional method of hand weeding. Chemical weed control is therefore gaining wide acceptability. However, literature on herbicide efficiency is both conflicting and confusing, with the same herbicide exhibiting extreme variation due to environmental factors. A study was therefore designed to assess the efficacy of herbicides under irrigated conditions of Tamil Nadu and the results are reported herein.

MATERIAL AND METHODS

The experiments were conducted at the Agricultural Research Station of the Tamil Nadu Agricultural University at Bhavanisagar for four consecutive seasons comprising two monsoon and two summer seasons during August 1976 to April 1978 on a red sondy loam soil in a split-plot design with three replications. The main plot consisted of combinations of plant density (29.6 and 44.4/m^2) and phosphorus (0, 40 and 80 kg P_2O_5/ha); weed control treatments enumerated below were assigned to the sub-plot.

T_1 Pre emergence application of alachlor (Lasso) 1.5 kg a.i/ha

Department of Agronomy, Tamil Nadu Agricultural University Coimbatore 641 003.

T_2 Pre emergence application of nitrofen (Tok E-25) 2.0 kg a. i/ha

T_3 Pre-sowing incorporation of penoxalin (Stomp) 2.0 kg a. i/ha

T_4 Hand weeding and hoeing twice 20 and 40 days after sowing.

T_5 Unweeded control.

POL 2 was the test variety which was sown in plots measuring 3.6 × 3.6 m.

At maturity weed count and weed dry matter were assessed following Burnside and Wicks (1965) from two random sites using a quadrat of 0.25 m^2 area. Besides pod yield, following growth and yield components were also recorded at maturity. (1) Plant height (2) number of branches / plant (3) nodules/ plant (4) root weight / plant (5) flowers / plant (6) leaf area index (LAI) (7) dry matter production (DMP) (8) pods / plant (9) 100 kernel weight.

RESULTS AND DISCUSSION

Data on weed count, weed dry matter growth and yield attributes and pod yield recorded during monsoon and summer seasons for two years were homogeneous and the pooled results are presented in Table I and II. The interaction of plant density and phosphorus levels with weed control treatments were not significant.

i) Effects of herbicides on total weed count and dry matter :

Total weed count and weed dry matter in the herbicide treated plots were as much as in those hand-weeded. Though alachlor was reported to give more effective control of weeds than nitrofen (Singh and Singh 1972, Gill and Brar, 1973; Thiagarajan, *et al.* 1973; Rathinam *et al.*, 1976) in the present study no differences between the herbicides were evident. These results were true of both the seasons.

ii) Effect of herbicides on growth attributes :

Penoxalin application, while having a depressing effect on plant height, exhibited an augmentative effect on LAI. Increase in plant height, (Saini and Tripathi, 1974; Chendrayan and Prasad, 1976) number of branches (Saini and Tripathi, 1974) or nodulation (Sankaran *et al.* 1974) following alachlor application was not evident. The negative effect of nitrofen on root weight reported by Reddy *et al.* (1978) also was not evident. Herbicides application however resulted in enhanced flower production in monsoon, penoxalin giving more flowers than either of the other two herbicides. DMP also registered an increase under herbicide treatment.

iii) Effect of herbicides on yield attributes and pod yield :

Weed growth restrained pod number by 12 per cent. While alachlor

and nitrofen enhanced pod number, penoxalin had a negative effect on this component. Increase in pod number due to alachlor has been reported earlier (Saini and Tripathi, 1974); Kulandaivel and Sankaran, 1977). Kernel weight or shelling percentage was not modified by herbicide application.

Yield depression due to weed infestation was in the region of 12 to 14 per cent, it being slightly more during monsoon (13.6%) than during summer (12.2%). The magnitude of yield loss has been reported to range from 20 per cent (Dalal *et al.* 1967), Sandhu and Gill, 1973) to 77 per cent (Schiller *et al*, (1976). Comparatively the yield decline observed in the present study may be considered minimal. This may be ascribed to lesser weed density (Hauser *et al.*, 1973) Pod yield under the various herbicide treatments was comparable with that obtained under hand weeding. Thus, herbicide application did not confer any additional benefit compared to mannual weeding. The superiority of alachlor over nitrofen (Singh and Singh, 1972; Gill and Brar, 1973; Thiagarajan *et al.*, 1973; Rathinam *et al.*, 1976) was not discernible. However, alachlor proved superior to penoxalin during both the seasons.

REFERENCES

BURNSIDE, O. C. and C. A. WICKS. 1965. Effect of herbicides and cultivation treatments on yield components of dryland sorghum in Nebraska. *Agron. J.*, **57**: 21—24.

CHANDRAYAN, K. and N. N. PRASAD. 1976. Effect of lasso on Rhizobium groundnut symbiosis. *Madras agric. J.*, **63** : 530—31.

DALAL, J. L., G. S. GILL, and J. S. SAINI. 1967. Effect of hoeing weeding cum manuring on the yield of rainfed groundnut in Punjab. *Indian J. Agron.*, **12**: 309—13.

GILL, H. S. and L. S., BRAR. 1973. Chemical control of weeds in groundnut *Proc. Weed Sci. Conf., Hissar, India.* P. 46—47.

HAUSER, E. W., P. W. SANTELMANN, G. A. BUCHANAN, and O. E. RUD. 1973. Controlling weeds in peanuts. Peanuts culture and uses. Ch. 10, 329—13. American Peanut Research and Education Association, INC. Agronomy Dept. Oklahoma State Univ., Stillwater, Oklahoma.

KULANDAIVELU, R. and S. SANKARAN. 1977. Efficiency of herbicides for weed control in irrigated groudnut. *Proc. Weed Sci.*, Hyderabad, India. P. 202 - 203.

REDDY, D. S., R.S. ANNAPPA, M. M. HOSMANI and G. D. RADDAR. 1978. Influence of the groundnut seed size on susceptability to nitrofen. *Proc. Weed Sci. Conf.*, Coimbatore, India.

RATHINAM, P., G. SELVARANGARAJAU, N. SANKARAN, S. SANKARAN and Y. B. MORACHAN. 1976. Studies on crop weed competition and weed control in groundnut. *Madras agric. J.*, **63** : 454—57.

SAINI, J. S. and H. P. TRIPATHI. 1974. Comparative effect of various herbicides on the control of weeds in groundnut. *Indian J. Weed Sci.*, **6** : 9:—100.

SANDHU, K. S. and G. S. GILL. 1973. Studies on critical period of weed competition in maize. *Indian J. Weed Sci.*, **5** : 1—5.

SANKARAN, S., R. KULANDAIVELU, R. KESAVAN and G. OBLISAMI. 1974. *Effect of alachlor on nodulation and yield of ground nut. Madras agric. J.*, **61** : 817—79.

SCHILLER, J. M. P. DOGKEAW, and P. JINA. 1976. Weed control in rainfed peanut production in North Thailand. *Thailand J.agric. Sci.*, **9** : 51—65.

SINGH, B. G., and D. J. C. SINGH. 1972. Studies on physiological effects of lasso and Tok E—25 on groundnut. *Andhra agric.*, **19** : 59—63.

THIAGARAJAN, C. P., M. V. KUMAR and U. S. SREERMULU. 1973. Effects of Tok. E.25 and lasso on weeds in the ground nut crops. *Pesticides*, **7** : 22—23.

TABLE I Weed growth, growth and yield attributes and pod yield at harvest of POL 2 groundnut cultivar under different herbicides (Monsoon)

	Weed Count/m²	Weed DM (g/m²)	Plant height (cm)	No. of branches	Nodule/ plant	Root wt. (g)	Flowers/ plant	LAI (60 DAS)	DMP kg/ha	pods/ pl.	100 kernel weight (g)	Shelling %	Yield kg/ha
T_1	74 (1.8)	30.1 (1.5)	49.7	4.74	12.23	3.30	52.7	5.54	6823	22.5	28.4	73.0	2556
T_2	82 (1.9)	32.3 (1.5)	47.7	4.56	11.79	3.21	53.7	5.24	6754	22.6	28.7	73.0	2483
T_3	67 (1.8)	31.7 (1.5)	46.4	4.77	11.92	3.09	63.2	6.34	6846	18.7	28.9	73.2	2288
T_4	76 (1.9)	33.6 (1.5)	49.1	4.64	11.96	3.21	41.0	5.06	6250	20.7	29.0	73.5	235
T_5	336 (2.5)	73.3 (1.8)	51.0	4.81	9.61	3.25	41.0	4.32	5626	18.4	28.0	73.8	2039
SE_d	0.13	0.13	1.1	0.10	0.51	0.20	2.7	0.36	157	0.6	0.3	0.3	121
CD (5%)	0.26	0.26	N. S.	N. S.	1.03	N. S.	8.5	0.72	311	1.2	N. S.	N. S.	241

Figures in parentheses denote transformed values.

TABLE II Weed growth, growth and yield attributes and pod yield at harvest of POL 2 groundnut cultivar under different herbicides (Summer).

	Weed count/m²	Weed DM (g/m²)	Plant height (cm)	No. of branches	Nodule/ plant	Root wt. (g)	Flowers/ plant	LAL (60 DAS	DMP kg/ha	Pods/ plant	100 kernel weight	Shelling	Yield kg/ha
T_1	40 (1.6)	12.1 (1.1)	43.3	4.48	15.16	4.36	56.2	4.74	7467	23.9	31.9	70.5	3186
T_2	49 (1.6)	16.3 (1.2)	41.9	4.40	14.39	4.27	58.0	4.44	7553	24.9	32.5	70.3	3107
T_3	45 (1.6)	15.4 (1.2)	39.9	4.47	13.56	4.29	66.2	5.60	7479	19.4	32.4	70.1	2883
T_4	54 (1.7)	17.1 (1.2)	44.0	4.53	14.39	4.30	43.5	4.36	6828	22.9	32.7	70.2	3001
T_5	161 (2.2)	34.1 (1.5)	45.0	4.45	10.60	4.26	43.2	3.48	5967	19.1	31.7	70.6	2635
SE_d	0.10	0.10	1.1	0.10	0.92	0.12	2.6	0.38	182	0.5	0.4	0.6	123
CD (5%)	0.19	0.20	2.2	N. S.	1.87	N. S.	N. S.	0.78	360	1.0	N. S.	N. S.	243

Figures in parentheses denote transformed values.