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## EFFECT OF CHEMICAL WEED CONTROL ON GROWTH AND YIELD OF GROUNDNUT

G. VELU., R. CHANDRA BABU and M. NAGARAJAN

Department of Crop Physiology TNAU, Coimbatore.

### ABSTRACT

The effect of certain pre-emergence herbicides on the growth and yield of two bunch groundnut varieties was field tested. The chemical weed control methods increased plant growth in terms of leaf area and dry matter. The chemical treatments gave higher pod yields in both the varieties by better weed control efficiency. The chemical treatments were compared with hand weeding given twice on 15 and 40 DAS. Among the chemicals imazethapyr at 2.30 kg ha<sup>-1</sup> gave higher yield through effective weed control.

Weed problem is very severe in the initial stages of growth of groundnut crop. The rate of growth of the groundnut crops being slow at the early stages, the weeds compete for the available water and nutrients. Maximum ground coverage is attained only around 60 days after sowing especially in bunch types. It is generally estimated that the yield of groundnut is reduced by 25 to 50% due to competition by weeds (Sankara Reddi, 1982). Earlier studies using herbicides indicated that fluchloralin affected crop stand in groundnut (Kulandaivelu et al., 1978). Alachor at 1.5 kg ha<sup>-1</sup> was found to have effective control (Kulandai velu and Sankaran, 1976). However information regarding the effect of chemical weed control on the growth behaviour of the groundnut is lacking and hence the present study was undertaken with the object of understanding the influence of chemical weed control on the growth and yield characteristics of groundnut.

### MATERIALS AND METHODS

A field experiment was conducted during February-May 1991 season in an experimental field

of the University with red sandy loam soil. The bunch varieties viz., CO 1 and CO 2 were employed. The experiment was laid down in a factorial randomised block design with three replications and ten treatments. The treatments were as follows, T1 - Unweeded control, T2 - Hand weeding, T3 - Pendimethalin (1.0 kg ha<sup>-1</sup>), T4 - pendimethalin (1.5 kg ha<sup>-1</sup>), T5 - Metolachlor (1.0 kg ha<sup>-1</sup>), T6 - metochlor (1.5 kg ha<sup>-1</sup>), T7 - Oxyfluorfen (0.10 kg ha<sup>-1</sup>), T8 - Oxyfluorfen (0.15 kg ha<sup>-1</sup>), T9 - Imazethapyr (0.15 kg ha<sup>-1</sup>), T10 - Imazethapyr (0.20 kg ha<sup>-1</sup>). In the treatment T2 handweeding was done at 15 and 40 days after sowing. The herbicide treatments were given as pre-emergence sprays.

A NPK dose of 17,34 and 54 kg ha<sup>-1</sup> was given basally. A spacing of 13 x 15 cm was adopted. Data on plant growth characteristics viz., leaf area index, and dry matter production and yield parameters viz., number of pegs, number of pods, pod yield, harvest index, shelling percentage were recorded besides observations on weed density and weed control efficiency.

Table 1. Effect of chemical weed control on crop growth and weed density in groundnut varieties.

Character	Variety	Treatment										CD 5%
		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	
Leaf area index	CO 1	0.40	0.53	0.57	0.61	0.61	0.60	0.52	0.57	0.66	0.69	--
	CO 2	0.44	0.59	0.69	0.68	0.63	0.68	0.63	0.63	0.72	0.75	--
Dry matter (g plant <sup>-1</sup> )	CO 1	37.5	40.2	38.6	39.2	37.5	38.0	37.6	38.4	42.6	43.8	1.78
	CO 2	38.6	42.4	39.2	40.8	40.2	41.6	40.0	49.0	42.3	43.5	2.15
Weed biomass (g m <sup>-2</sup> )	CO 1	201	67	87	84	96	92	100	97	21	20	7.60
	CO 2	198	56	73	80	90	87	90	89	20	19	9.90
Weed control efficiency (%)	CO 1	-	67	57	58	52	54	50	52	90	90	--
	CO 2	-	71	63	59	54	56	54	55	90	91	--
Weed Index (%)	CO 1	44.3	10.0	8.0	3.4	2.9	3.2	11.3	10.7	2.5	-	--
	CO 2	45.9	21.0	19.7	16.7	14.1	14.2	18.7	19.0	1.2	-	--

## RESULTS AND DISCUSSION

Data on leaf area index indicated that in both the varieties there was considerable increase in LAI in all the chemicals tried over both hand weeding and unweeded control (Table 1). Among the several herbicides tested imazethapyr at 0.2 kg ha<sup>-1</sup> recorded higher LAI in both CO 1 (0.691) and CO 2 (0.752) over handweeding (0.525 and 0.589 respectively). Similar trend was observed in terms of total biomass production. The herbicide treatments increased the total dry matter than the T1 and T2. Again maximum dry matter was recorded in the T10 with 43.8 and 43.5 g/plant in CO 1 and CO 2 respectively.

Observations on weed biomass, weed control efficiency and weed index at harvest are given (Table 1). In general, the herbicides given a better weed control effect than the hand weeding. Among

the treatments, the imazethapyr at 0.2 kg ha<sup>-1</sup> gave lesser weed biomass (19.8 and 18.5 g m<sup>-2</sup>) in CO 1 and CO 2 respectively. The hand weeded treatment recorded 67.2 and 56.4 g m<sup>-2</sup> weed biomass in CO 1 and CO 2 respectively at harvest. The weed control efficiency was maximum (89.7 and 90.0 in CO 1 and CO 2 respectively) in imazethapyr 0.2 kg ha<sup>-1</sup> as against the normal practice of hand weeding with a WCE of 66.6 and 81.4 in CO 1 and CO 2 respectively. Similarly the same treatment had very low weed index at harvest indicating its effective weed control efficiency over rest of the treatments.

Data on yield parameters are presented (Table 2). In both the varieties the imazethapyr at 0.2 kg ha<sup>-1</sup> produced more number of mature pods than the rest of the treatments. This treatment gave 23.7 and 22.5 mature pods in CO 1 and CO 2 respectively as compared to 18.2 and 21.5 in the

Table 2. Effect of chemical weed control on yield and yield parameters in groundnut varieties.

Character	Variety	Treatment										CD 5%
		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	
Pegs No. Plant <sup>-1</sup>	CO 1	8.6	11.2	10.3	10.6	9.2	8.4	10.2	11.2	8.6	9.4	NS
	CO 2	9.4	11.8	11.3	12.1	10.6	11.5	12.3	11.6	9.7	10.2	NS
Immature pods No. plant <sup>-1</sup>	CO 1	6.2	7.2	5.4	7.6	8.4	7.2	6.5	4.6	5.1	5.4	NS
	CO 2	5.6	8.1	5.8	6.4	7.1	6.6	5.4	4.8	5.8	6.1	NS
Mature pods No. Plant <sup>-1</sup>	CO 1	13.0	18.2	16.5	17.5	19.6	18.4	19.1	17.2	21.5	23.7	1.48
	CO 2	15.8	21.5	18.5	19.1	19.5	21.2	23.1	19.4	21.8	22.5	1.96
Harvest Index (%)	CO 1	20.8	25.4	24.9	25.5	22.9	24.7	23.9	26.6	29.3	29.2	3.5
	CO 2	23.8	26.9	26.9	26.5	26.1	26.0	25.5	28.8	30.3	29.9	3.4
100 kernel weight (g)	CO 1	22.1	24.3	23.5	24.9	22.9	24.7	25.9	26.5	27.4	30.2	2.4
	CO 2	22.8	26.3	27.2	26.9	25.3	26.0	25.7	26.8	27.9	29.6	3.8
Shelling per cent	CO 1	56.5	60.7	59.6	57.3	54.7	61.3	61.4	63.9	65.6	66.4	1.8
	CO 2	58.1	60.7	63.7	60.4	59.5	60.0	61.8	60.5	62.1	67.5	2.1
Pod yield (kg ha <sup>-1</sup> )	CO 1	748	1204	1237	1297	1302	1299	1191	1198	1309	1342	92.0
	CO 2	871	1273	1293	1343	1384	1383	1310	1305	1593	1612	84.0
Haulms yield (kg ha <sup>-1</sup> )	CO 1	2003	2194	2103	2152	2125	2153	2125	2126	2236	2292	105.0
	CO 2	2016	2506	2367	2472	2503	2452	2549	2464	2674	2678	124.0

handweeding treatment. Correspondingly the chemical treatment gave lesser number of pegs and immature pods at harvest than the hand weeded check in both the varieties. The herbicide treatments gave higher pod yield than both the control treatments. For instance, the imazethapyr at  $0.20 \text{ kg ha}^{-1}$  gave a pod yield of 1342 and 1612  $\text{kg ha}^{-1}$  in CO 1 and CO 2 in the hand weeded check. This increased yield was brought about by higher shelling per cent, 100 kernel weight and more number of mature pods.

With the better control on the weed growth the crop could have effectively utilized available water, nutrient, light and space this possibly would have

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## STUDIES ON CHLOROPHYLL, NODULATION, NITROGEN FIXATION, SOYBEAN YIELD AND THEIR CORRELATIONS AS INFLUENCED BY MICRONUTRIENTS.

D.B.BHANAVASE, B.R.JADHAV, C.R.KSHIRSAGAR, and P.L.PATIL  
Mahatma Phule Krishi Vidyapeeth, Agril.College, Pune-411 005

### ABSTRACT

A pot culture experiment results revealed that application of  $\text{FeSO}_4$ ,  $\text{ZnSO}_4$  treatments showed beneficial effects on chlorophyll content of soybean leaves, nodulation, dry weight of nodules/plant, grain and dry matter yield/plant as compared to control and treatments of  $\text{CuSO}_4$  and  $\text{MnSO}_4$  in both soybean varieties. Chlorophyll content, number of nodules/plant, fresh and dry weight of nodules/plant at 50% flowering as well as pod formation stage indicated positive correlation with seed and dry matter yield/plant. The characters showing positive association with yield/plant were also associated amongst themselves except nitrogen in nodules at pod formation stage.

The soybean (*Glycine max. L.*) a popular crop is cultivated throughout the world. It is one of the important protective food crop for meeting high demand of protein and oil. So soybean is introduced and intensive efforts are being made to popularise it with view to reduce the shortage of edible oil in India. But basic information on the influence of various micronutrients on chlorophyll content, nodulation, nitrogen fixation as well as correlations among the various characters are inadequate in soybean crop. Hence a study was made on chlorophyll content, nodulation, nitrogen fixation, soybean yield and their correlations as influenced by various micronutrients.

### MATERIALS AND METHODS

A pot culture experiment was conducted during the summer of 1992 to study on chlorophyll

lead to more growth and yield than the traditional methods of weeding where considerable amount of nutrients and water is taken by the competing weeds. Among the several treatments imazethapyr gave higher with effective control of weed growth.

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content, nodulation, nitrogen fixation, soybean yield and their correlation as influenced by micronutrients. Soil was sterilized by autoclaving for 2 hours having pH 7.8., E.C. = 0.39  $\text{mmhos/Cm}^2$ , Organic Carbon = 0.56%, Total nitrogen - 0.054%. Soybean seed Cv. MACS-57 and MACS-13 were inoculated with an efficient culture of *Bradyrhizobium Japonicum*. Treatments consisted of the soil application of  $M_1 = \text{FeSO}_4$ ,  $M_2 = \text{ZnSO}_4$ ,  $M_3 = \text{CuSO}_4$  and  $M_4 = \text{MnSO}_4$  @ 25  $\text{kg/ha}$  and two soybean cultivars viz.  $V_1$  - MACS-57 and  $V_2$  -MACS-13 were used in combination indicated below:

- |              |               |
|--------------|---------------|
| 1) $V_1$     | 6) $V_2$      |
| 2) $V_1 M_1$ | 7) $V_2 M_1$  |
| 3) $V_1 M_2$ | 8) $V_2 M_2$  |
| 4) $V_1 M_3$ | 9) $V_2 M_3$  |
| 5) $V_1 M_4$ | 10) $V_2 M_4$ |