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Effect of weed control on nutrient uptake, weed weight and yield of groundnut

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ABSTRACT
A field experiment conducted at Post Graduate Institute Research Farm, MPKV., Rahuri, Ahmednagar (M. S.) during the rainy season of 2000, revealed that the weed free condition throughout the crop growth period in groundnut (*Arachis hypogaea* L.) drastically reduced with dry matter, N, P and K uptake by weeds and increased the pod yield, N, P and K uptake by groundnut crop. Application of oxyfluorfen @ 0.125 kg a. i. ha^{-1} + glyphosate @ 1.5 kg ha^{-1}, oxyfluorfen @ 0.125 kg a. i. ha^{-1} + hand weeding 30 DAS and two hand weeedings (20 and 40 DAS) were next to weed free in giving higher pod yield and nutrient uptake by crop and were at par.

Key words : Groundnut, Weed control, Herbicides, Soil solarization, Nutrient uptake, Weed dry matter.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop of India. The productivity of groundnut during rainy season is not stable due to various reasons. Among them weed infestation is considered to be one of the problems. Yield loss due to weed infestation amounts to 75 per cent (Gnanamurthy and Balasubramaniyan, 1998). Weeds not only compete with crop for resources like soil moisture, nutrients, light and space but also interfere with pegging, pod development and harvesting of groundnut. The critical period of weed competition was found to be first three to four weeks of crop growth (Kalaiselvan *et al.* 1991). Cultural method of weed control is a common practice followed in groundnut. These practices are time consuming, expensive and tedious. Under such situation use of herbicides is the only choice available for weed control. Reduced rates of herbicides in combination with inter-row cultivation or post emergence herbicides may also offer a viable alternative. The present investigation was therefore undertaken to find out an efficient weed management system in groundnut for increasing the productivity of this crop.

MATERIALS AND METHODS

The experiment comprised of 10 treatments, the details of which are furnished in Table 1. The experiment was laid out in randomised block design with three replications at Post Graduate Institute Research Farm, Rahuri (19° 48' N latitude and 74° 19' E longitude) during *kharif* season of 2000. The soil was clay loam containing 113.82, 15.18 and 421.70 kg ha^{-1} available nitrogen, phosphorus and potassium, respectively. Groundnut variety SB-XI was dibbled on 3.7.2000 at spacing of 30 x 10 cm. A uniform dose of 25 kg N + 50 kg P_2O_5 ha^{-1} was applied as basal application. Crop was harvested on 18.10.2000. Pre-emergence application of oxyfluorfen was made one day after sowing and post emergence application of oxyfluorfen and glyphosate was made 20 days after sowing. For soil solarization, in summer months, the plots were covered with transparent polyethylene sheet (0.014 mm) for 30 days following the procedure of Chauhan *et al.* (1988). All such plots were uniformly irrigated to field capacity one day prior to imposing the treatments. Fifteen days prior to sowing of groundnut, the finally prepared plot was uniformly irrigated to field capacity. A flush of young weed seedlings appeared was removed by harrowing in state bed technique.

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RESULTS AND DISCUSSION

Weed dry weight

The data on weed dry weight, pod yield and nutrient uptake by crop and weeds are presented in Table 1. The highest weed weight (17.13 q/ha^{-1}) was recorded in unweeded control (T_{10}). Weed free check recorded significantly lowest weed weight. It was followed by pre-emergence application of oxyfluorfen @ 0.125 kg a. i. ha^{-1} + glyphosate (DOE) @ 1.5 kg a. i. ha^{-1}, oxyfluorfen (PE) @ 0.125 kg a. i. ha^{-1} + 1 HW at 30 DAS, soil solarization for 30 days and early post application of oxyflorfen @ 0.25 kg a. i. ha^{-1} which were at par with each other.

Nutrient uptake by weeds and crop

Nutrient removal by weeds was maximum in unweeded control (16.45, 3.09 and 3.97 kg, N, P and K ha^{-1}, respectively) in which crop uptake was minimum (45.81, 17.40 and 9.94 kg N, P and K ha^{-1}). This may be due to higher weed density and weed dry matter. Weeds which competed with crop for various growth resources depleted greater amounts of nutrients and thus deprived the crop of nutrients. Sounder Rajan *et al.* (1985) also reported that nutrient removal by weeds was maximum in unweeded control, in which crop uptake was minimum. The maximum nutrient uptake by crop was observed in weed free check (90.82, 34.35 and 20.07 kg N, P and K ha^{-1}) followed by T_5, T_8 and T_3 which were at par with it for N and P uptake. This may be due to lower weed population and weed weight which led to lower uptake of nutrients by weeds thus resulting in higher pod yields. Pannu *et al.* (1989) reported that uptake of N, P and K by crop was dependent mainly on the dry matter accumulation by weeds.

Table 1 : Effect of weed control treatments on nutrient uptake by crop and weeds (kg ha^{-1}), weed weight (q ha^{-1}) and pod yield (q ha^{-1})

Treatment	Weed weight (q ha^{-1})	Nutrient uptake by weed (kg ha^{-1})			Pod yield (q ha^{-1})	Nutrient uptake by crop (kg ha^{-1})		
		N	P	K		N	P	K
T_1 : Oxyfluorfen 23.5 % EC (PE) @ 0.25 kg a. i. ha^{-1}	3.17	1.62	0.61	0.57	10.39	67.93	26.11	14.42
T_2 : Oxyfluorfen 23.5 % EC (POE) @ 0.125 kg a. i. ha^{-1}	4.44	2.96	0.84	0.84	8.63	57.47	21.42	11.19
T_3 : Oxyfluorfen 23.5 % EC (PE) @ 0.125 kg a. i. ha^{-1} + 1 HW 30 DAS	2.79	1.27	0.48	0.48	12.05	81.86	31.20	18.04
T_4 : Glyphosate 41 % EC (POE) @ 1.5 kg a. i. ha^{-1}	4.29	2.49	0.73	0.76	9.37	62.54	24.48	14.32
T_5 : Oxyfluorfen 23.5 % EC (PE) @ 0.125 kg a. i. ha^{-1} + Glyphosate 41 % EC (POE) @ 1.5 kg a. i. ha^{-1}	2.16	0.69	0.40	0.44	12.22	85.76	32.59	18.79
T_6 : Soil solarization for 30 days	3.02	1.47	0.52	0.60	11.45	76.27	28.53	16.41
T_7 : Stale bed technique (Irrigated plot 15 days before sowing then harrowing)	12.06	9.04	2.29	2.52	7.18	47.71	18.84	10.42
T_8 : Two hand weedings (20 and 40 DAS)	3.94	1.22	0.69	0.75	12.45	83.84	32.35	17.99
T_9 : Weed free	0.77	0.16	0.13	0.13	13.05	90.82	34.35	20.07
T_{10} : Unweeded control	17.13	16.45	3.09	3.97	6.92	45.81	17.40	9.94
S. E. m±	0.35	0.26	0.09	0.11	0.42	3.35	0.77	0.39
CD (P = 0.05)	1.05	0.76	0.25	0.32	1.25	9.95	2.29	1.15

PE = Pre-emergence; POE = Post emergence; DAS = Days after sowing; HW = Hand weeding

Groundnut yield

The pod yield was maximum in weed free check (13.05 q/ha^{-1}) and was at par with T_8, T_5 and T_3. Among integrated weed management treatments, T_5 recorded higher pod yield (12.22 q/ha^{-1}) and was on par with T_3 and T_6. Unweeded control recorded significantly lowest pod yield (6.92 q/ha^{-1}) which was at par with that observed under stale bed technique. Bhagat (1997) observed that highest yield in 2 hand weedings (13.8 q/ha^{-1}) followed by oxyfluorfen (PE) @ 0.1 kg a. i. ha^{-1} + HW (12.5 q/ha^{-1}). Efficient control of weeds in early stages by herbicides and later by cultural treatments or post emergence herbicides reduced the weed population and dry matter accumulation by weeds and ultimately led to lower uptake

Table 2 : Correlation matrix

	Pod yield	Weed weight	N uptake by weeds	P uptake by weeds	K uptake by weeds	N uptake by crop	P uptake by crop	K uptake by crop
Pod yield	1.000	-0.848**	-0.827**	-0.857**	-0.822**	0.996**	0.994**	0.983**
Weed weight		1.000	0.990**	0.999**	0.997**	-0.834**	-0.830**	-0.800**
N uptake by weeds			1.000	0.985**	0.995**	-0.809**	-0.812**	-0.755**
P uptake by weeds				1.000	0.994**	-0.842**	-0.838**	-0.810**
K uptake by weeds					1.000	-0.806**	-0.804**	-0.772*
N uptake by crop						1.000	0.998**	0.990**
P uptake by crop							1.000	0.993**
K uptake by crop								1.000

** - Significant at 5 %

of nutrients by weeds and on the contrary led to higher uptake of nutrients by groundnut.

Correlation

The correlation matrix (Table 2) clearly indicated that there was positive correlation between weed weight and nutrient uptake by weeds (r = 0.990, r = 0.999 and r = 0.997 for N, P and K, respectively). On the contrary there was a negative relationship between weed weight and nutrient uptake by crop (r = -0.834, r = -0.83 and r = -0.80 for N, P and K, respectively). Pod yield was negatively correlated with N, P and K uptake by weeds (r = -0.827, r = -0.857 and r = -0.822, respectively) and positively correlated with N, P and K uptake by crop (r = 0.996, r = 0.994 and r = 0.983, respectively).

REFERENCES

Bhagat R. S. (1997). Integrated weed management in groundnut (*Arachis hypogaea,* L.) M. Sc. (Agri.) thesis submitted to Dr. PDKV., Akola, India.

Chauhan Y. S., Nene Y. L., Johansen C., Haware M. P., Saxena N. P., Singh S., Sharma S. B., Sahrawat R. L., Burford J. R., Rupela O. P., Kumar Rao J. V. D. K. and Sithanantham S. (1988). Effects of soil solarization of pigeonpea and chickpea. Res. Bull. II, ICRISAT, Patencheru, pp. 16.

Gnanamurthy P. and Balasubramanian P. (1998). Weed management practices and their influence on weed growth and yield of groundnut. *Indian J. Agron.* **43 (1) :** 122-125.

Kalaiselvan P., Ramadas G. R. and Vaman Bhat M. (1991). Studies on crop weed competition in groundnut. *Madras Agric. J.* **78 :** 385-388.

Pannu R. K., Malik, D. S., Malik R. K. and Singh K. P. (1989). Effect of crop geometry, irrigation and weed control on growth and nutrient uptake by weed and groundnut. *Indian J. Agron*. **34 (1) :** 8-13.

Soundara Rajan M. S., Sudhakara Rao R. and Seshaiah T. (1985). Nutrient losses due to weed competition in irrigated groundnut. *Oilseed J.* pp. 31-32.

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