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Narayana S Mavarkar
College of Agriculture, Department of Agronomy, University of Agricultural and Horticultural Sciences, Navile, Shivamogga, Karnataka, India

Murali M Gandhi
College of Agriculture, Department of Agronomy, University of Agricultural and Horticultural Sciences, Navile, Shivamogga, Karnataka, India

M Gandhi
College of Agriculture, Department of Agronomy, University of Agricultural and Horticultural Sciences, Navile, Shivamogga, Karnataka, India

Basavaraj M
College of Agriculture, Department of Agronomy, University of Agricultural and Horticultural Sciences, Navile, Shivamogga, Karnataka, India

Sharanappa HG
College of Agriculture, Department of Agronomy, University of Agricultural and Horticultural Sciences, Navile, Shivamogga, Karnataka, India

Madhu G
College of Agriculture, Department of Agronomy, University of Agricultural and Horticultural Sciences, Navile, Shivamogga, Karnataka, India

Correspondence
Narayana S Mavarkar
College of Agriculture, Department of Agronomy, University of Agricultural and Horticultural Sciences, Navile, Shivamogga, Karnataka, India

Yield and economics of summer groundnut (*Arachis hypogaea* L.) as influenced by weed management practices under Southern transitional zone of Karnataka

Narayana S Mavarkar, Murali, M Gandhi, Basavaraj M, Sharanappa HG and Madhu G

Abstract
A field experiment was conducted during the summer season of 2015 at Zonal Agricultural Research Station, University of Agricultural and Horticultural Sciences, Navile, Shivamogga, Karnataka, to assess impact of weed management practices on groundnut (*Arachis hypogaea* L.) productivity and to evolve efficient weed management practice. Pre-emergence application of imazethapyr @ 100 g a. i. ha^{-1} effectively controlled the dry matter accumulation in weed compared with weedy check, farmer's practice, fenoxaprop-P (post-em) @ 75 g a. i. ha^{-1}, quizalofop-P (post-em) @ 50 g a. i. ha^{-1}, fluazifop-P (post-em) @ 100 g a. i. ha^{-1}, chlorimuron (post-em) @ 10 g a. i. ha^{-1}, imazaquin (post-em) @ 100 g a. i. ha^{-1}, oxyfluorfen (pre-em) @ 100 g a. i. ha^{-1} and pendimethalin (pre-em) @ 1.0 kg a. i. ha^{-1} but at par with recommended cultural practice (two hand weedings followed by two intercultivations) and alachlor (pre-em) @ 2.0 kg a. i. ha^{-1}. Among the weed management treatments tried weed-free check, recommended cultural practice and imazethapyr (pre-em) @ 100 g a. i. ha^{-1}, had a pronounced effect on the yield attributes, yield and net returns as compared to unweeded crop.

Keywords: Pre emergent, ground nut, weed

Introduction
Groundnut (*Arachis hypogaea* L.) popularly known as "King of Oilseed Crops" on account of its diversified uses. It is one of the chief protein rich vegetable oilseed crop of the world belongs to the family *Fabaceae*, which ranks thirteenth in its importance among world food crops. Groundnut being a potentially high yielding crop can play an important role in boosting oilseed production in India. It is the world leading principal oilseed crop stands first among nine oilseed crops in production in the country. Groundnut traditionally called as "Poor Man's Almond" is valued for its outstanding rich source of energy and versatile nutritional qualities. The kernel contains about 50 per cent oil, 25 per cent protein and 20 per cent carbohydrates; it is also rich in minerals, vitamins and essential amino acids (www.icrisat.org).

Indian has a diverse climate, as such groundnut is grown throughout the year in kharif, rabi, summer and spring seasons in one or other part of the country. The productivity of crops under irrigated condition is not stable due to various reasons. Among them weed infestation is considered to be one of the major problems. Yield loss due to weed infestation amounts to 80 per cent in groundnut (Murthy *et al*., 1994) [5].

Weed infestation in summer groundnut (*Arachis hypogaea* L.) is one of the main factors for loss in yields to the tune of 17-84 per cent (Sasikala *et al*., 2006) [8]. Weeds drain the fertilizers applied and moisture conserved before sowing and thus has a greatest competitive effect on crop. Though farmers are aware of these problems they follow traditional approaches like manual hand-weeding and hoeing. Today Indian farmers are facing a lot of hardships economically owing to hike in labour costs and scarcity of labour. Keeping in view these difficulties, the present investigation was undertaken to identify a suitable weed management practice in summer groundnut.

Material And Methods
The field experiment was conducted during the summer season of 2015 on sandy loam soil (*Alfisols*) at ZARS farm, University of Agricultural and Horticultural Sciences, Navile,

Shivamogga. The soil contained 63 % sand, 25 % silt and 12 % per cent clay, with a bulk density of 1.6 g $cc^{-1,}$ field capacity and 14. 4 % and pH 6.5 100 g^{-1} soil. The soil had organic carbon content of 0.53 %, total N 210.5 kg ha^{-1}, available P_2O_5 50.4 kg ha^{-1} and available K_2O 290 kg ha^{-1}. The experiment was laid out in randomized complete block design with 14 treatments replicated thrice. The treatments included five pre and five post-emergence herbicides, farmer's practice, weedy check and weed-free check (Table 1). The gross plot size was 5.4 m X 4.0 m. Crop variety TMV-2 groundnut 100 kg ha^{-1} was sown on 05 January 2015, at inter and intra-row spacing of 30 and 10 cm, respectively. Groundnut kernels were treated with thiram @ 2.5 g kg^{-1} of kernel before sowing to prevent the crop against seed born pathogens. A basal dose of 25 kg N, 75 kg P_20_5 and 38 kg K_20 ha^{-1} was applied through urea, single super phosphate and muriate of potash respectively. Gypsum @ 500 kg ha^{-1} applied to the crop at sowing. Irrigations (8), one light pre-sowing irrigation and each at 25, 35, 45, 55, 70, 90 days after sowing (DAS) and a pre harvesting irrigation was given two days before harvesting for easy uprooting of pods. All herbicides were sprayed using hand operated knapsack sprayer; pre-emergence herbicides were applied at one day after sowing at the spray volume of 750 litres ha^{-1} and post-emergence herbicides were sprayed at 15 DAS at the spray volume of 500 litres ha^{-1}. Intercultural operations and hand weeding were done as per treatment (Table 1). All the recommended package of practices was followed to raise the crop. Weed samples were collected by placing 1.0 m^2 quadrate at 30, 60, 90 DAS and at harvest far weed density and dry matter. The crop was harvested on April 30, during 2007 and all observations were recorded.

Results and Discussion

Yield and yield attributes: The pod yield of groundnut increased by different weed control treatments. Recommended cultural practice gave highest pod yield (2880 kg ha^{-1}) and was superior to all other weed control treatments and weedy check. Among the herbicidal treatments pre-emergence application of imazethapyr @ 100 g a. i. ha^{-1} (2791 kg ha^{-1}) being at par with alachlor @ 2.0 kg a. i. ha^{-1} (2702 kg ha^{-1}), metolachlor @ 1.0 kg a. i. ha^{-1} (2650 kg ha^{-1}), pendimethalin @ 1.0 kg a. i. ha^{-1} (2598 kg ha^{-1}) and oxyfluorfen @ 100 g a. i. ha^{-1} (2546 kg ha^{-1}) and found to be statistically significant over post-emergence herbicides (Table 2). Similar results were also recorded by Jayarama (2001) [3]. Higher pod yield obtained under recommended cultural practice is in accordance with that cultural practices had cumulative effect facilitating peg penetration and pod development with less weed competition as evidenced from data on weed density and dry matter accumulation by weeds (Table 1). This consequently increased the pod yield of groundnut (Rajan *et al*., 1984) [7] and Singh *et al*., (1997) [9]. Weed density and its dry weight among herbicidal treatments were lower under pre-emergence application of imazethapyr @ 100 g a. i. ha^{-1}, alachlor @ 2.0 kg a. i. ha^{-1}, metolachlor @ 1.0 kg a. i. ha^{-1}, pendimethalin @ 1.0 kg a. i. ha^{-1} and oxyfluorfen @ 100 g a. i. ha^{-1} which might also result in increased pod yield under these treatments.

There was significant increase in number of pods and filled pods per plants with pre-emergence application of herbicides, as the pre-emergence herbicides might have reduced the weed growth at the early phase of crop growth. Hence the use of herbicides less weed dry matter was recorded at 30, 60, 90 DAS and at harvest stage of groundnut. However, recommended cultural practice retarded growth and dry matter of weeds up to harvest.

Pre-emergence application of imazethapyr @ 100 g a. i. ha^{-1}, alachlor @ 2.0 kg a. i. ha^{-1}, metolachlor @ 1.0 kg a. i. ha^{-1} over weedy check, the increase in pod yield was to the tune of 282.20, 270.20 and 267.95 per cent respectively (Table 2). This might be due to the pre-emergence application of herbicides which suppressed the initial weed growth. Further, the high yield with these treatments might also be because of the utilization of available nutrients by the crop otherwise utilized by the weeds. This was supported by the lower dry weight of weeds and higher yield attributing characters under these treatments, resulting in higher pod yield. Sumathi *et al*. (2000) [10] also reported the beneficial effect of herbicides in the control of weeds in groundnut crop.

Thus, chemical weed control with imazethapyr @ 100 g a. i. ha^{-1} in summer groundnut is effective and feasible method whenever the labour scarcity arises during the peak season. Higher pod yield was recorded in the same treatment.

Table 1: Physico-chemical properties of soil at the experimental site

Particulars	Method employed	Values
1. Physical properties		
Sand (%)	International pipette method (Piper, 1966)	63
Silt (%)	International pipette method (Piper, 1966)	25
Clay (%)	International pipette method (Piper, 1966)	12
Bulk density (g cc^{-1})	Core sampler method (Piper, 1966)	1.6
Field capacity (%)	Field method (Piper, 1966)	14.4
2. Chemical properties		
Available N (kg ha^{-1})	Alkaline permanganate method (Jackson, 1973)	210.5
Available P_2O_5 (kg ha^{-1})	Bray's method (Jackson, 1973)	50.4
Available K_2O (kg ha^{-1})	Flame Photometry (Jackson, 1973)	290
E C (dS m^{-1} 25^0C)	Conductivity bridge (Jackson, 1973)	0.25
Soil pH	Potentiometric method (Jackson, 1973)	6.5
Organic carbon (%)	Walkley and Black wet oxidation (Piper, 1966)	0.53

Table 2 : Pod yield (kg ha^{-1}), number of pods (plant^{-1}) and number of filled pods (plant^{-1}) at harvest in summer groundnut as influenced by weed management practices

Treatments		Pod yield (kg ha^{-1})	No. of pods plant^{-1}	No. of filled pods plant^{-1}
T_1	Alachlor @ 2.0 kg a. i. ha^{-1} (Pre-em) 1 DAS	40.13	29.27	2702
T_2	Metolachlor @ 1.0 kg a. i. ha^{-1} (Pre-em) 1 DAS	39.67	28.73	2650
T_3	Pendimethalin @ 1.0 kg a. i. ha^{-1} (Pre-em) 1 DAS	38.53	27.27	2598
T_4	Oxyfluorfen @ 100 g a. i. ha^{-1} (Pre-em) 1 DAS	37.80	26.07	2546
T_5	Imazethapyr @ 100 g a. i. ha^{-1} (Pre-em) 1 DAS	40.93	30.33	2791
T_6	Chlorimuron @ 10 g a. i. ha^{-1} (Post-em) 15 DAS	36.73	24.67	2420
T_7	Imazaquin @ 100 g a. i. ha^{-1} (Post-em) 15 DAS	37.47	25.67	2494
T_8	Fenoxaprop-P @ 75 g a. i. ha^{-1} (Post-em) 15 DAS	34.60	21.47	2227
T_9	Fluazifop-P @ 100 g a. i. ha^{-1} (Post-em) 15 DAS	35.33	22.93	2331
T_{10}	Quizalofop-P @ 50 g a. i. ha^{-1} (Post-em) 15 DAS	35.06	22.20	2279
T_{11}	Farmer's practice (1 HW + 2 IC)	31.27	16.73	1700
T_{12}	Recommended cultural practice (2 HW + 2 IC)	41.67	31.33	2880
T_{13}	Weedy check	27.20	12.27	989
T_{14}	Weed free check	42.93	32.87	2970
S. Em ±		159.48	2.65	1.98
C. D. (p = 0.05)		463.71	7.71	5.78

Note:
DAS = Days after sowing
Pre-em = Pre-emergence
Post-em = Post-emergence
HW = Hand weeding
IC = Intercultivation

Table 3: Economics in summer groundnut as influenced by weed management practices

Treatments		Cost of cultivation (Rs. ha^{-1})	Cost of weed management (Rs. ha^{-1})	Gross return (Rs. ha^{-1})	Net return (Rs. ha^{-1})	Marginal return (Rs. ha^{-1})	Benefit cost ratio	Marginal benefit cost ratio
T_1	Alachlor @ 2.0 kg a. i. ha^{-1} (Pre-em) 1 DAS	24,740	1,490	74,725	49,985	47,305	2.02	31.74
T_2	Metolachlor @ 1.0 kg a. i. ha^{-1} (Pre-em) 1 DAS	24,260	1,010	73,293	49,033	45,873	2.02	45.41
T_3	Pendimethalin @ 1.0 kg a. i. ha^{-1} (Pre-em) 1 DAS	24,610	1,360	71,860	47,250	44,440	1.91	32.67
T_4	Oxyfluorfen @ 100 g a. i. ha^{-1} (Pre-em) 1 DAS	24,140	890	70,426	46,286	43,006	1.91	48.32
T_5	Imazethapyr @ 100 g a. i. ha^{-1} (Pre-em) 1 DAS	23,960	710	77,180	53,220	49,760	2.22	70.08
T_6	Chlorimuron @ 10 g a. i. ha^{-1} (Post-em) 15 DAS	24,660	1,410	66,948	42,288	39,528	1.71	28.03
T_7	Imazaquin @ 100 g a. i. ha^{-1} (Post-em) 15 DAS	23,750	500	68,993	45,243	41,573	1.90	83.14
T_8	Fenoxaprop-P @ 75 g a. i. ha^{-1} (Post-em) 15 DAS	24,460	1,210	61,624	37,164	34,204	1.51	28.26
T_9	Fluazifop-P @ 100 g a. i. ha^{-1} (Post-em) 15 DAS	24,960	1,710	64,492	39,532	37,072	1.58	21.67
T_{10}	Quizalofop-P @ 50 g a. i. ha^{-1} (Post-em) 15 DAS	24,960	1,710	63,057	38,097	35,637	1.52	20.84
T_{11}	Farmer's practice (1 HW + 2 IC)	24,850	1,600	47,062	22,212	19,642	0.89	12.27
T_{12}	Recommended cultural practice (2 HW + 2 IC)	25,650	2,400	79,634	53,984	52,214	2.10	11.06
T_{13}	Weedy check	23,250	0	27,420	4,170	0	0.17	0.00
T_{14}	Weed free check	33,250	10,000	82,087	48,837	54,667	1.46	5.46

Note:
Alachlor (Lasso 50 E.C.) =320 Rs. litre^{-1}
Metolachlor (Dual 50 E.C.) =400 Rs. litre^{-1}
Pendimethalin (Stomp 35 E.C.) =400 Rs. litre^{-1}
Oxyfluorfen (Goal 23.5 E.C.) =160 Rs. litre^{-1}
Imazethapyr (Pursuit 10 S.L.) =500 Rs. litre^{-1}
Chlorimuron (Classic 25 W.P.) =30 Rs. g^{-1}
Imazaquin (Septer 17.5 S.L.) =500 Rs. litre^{-1}
Fenoxaprop-P (Whip super 9 E.C.) =300 Rs. litre^{-1}
Fluazifop-P (Fusilade 12.5 E.C.) =150 Rs. 100 ml^{-1}
Quizalofop-P (Targa super 5 E.C.) =150 Rs. 100 ml^{-1}
Women labour (day^{-1}) =50 Rs.
Men labour (day^{-1}) =70 Rs
Ploughing charges bullock pair (day^{-1}) =Rs. 200
Groundnut pods (APMC price kg^{-1}) =Rs. 27
Groundnut haulm (tonne^{-1}) =Rs. 500

References

1. Gujjari Ak, Manjappa K, Desai Bk, Chanrdanath Hp. Integrated weed management in groundnut. *J. Oilseeds Res.*, 1996; 12(1):65-68.
2. Jackson ML. Soil Chemical Analysis. Prentice Hall (India) Pvt. Ltd., New Delhi, 1973.
3. JAYARAMA KA. Functional growth model in relation to weed management in groundnut (*Arachis hypogaea* L.). M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Bangalore.
4. management in rainfed groundnut. *Pestic*. 2001; 18:63.
5. Murthy Bg, Agasimani Ca, Pratibha Nc. Influence of herbicides on yield, quality and economics in rainfed groundnut. Journal of Oil Seeds Research. 1994; 11:285-287.
6. Piper Cs. Soil and Plant Analysis. Academic Press, New York, 1966, 55.
7. Rajan MSS, Rao RS, Seshaiah T. Weed flora in groundnut as influenced by herbicides. *Madras Agric. J*., 1984; 71:697-698.
8. Sasikala B, Radha Kumari C, Obulamma U, Raghava Reddy. Effect of chemical weed control on yield and economics of rabi groundnut. J. Res. ANGRAU., 2006; 34(3):70-73.
9. Singh Ak, Mahapatra Bs, Sharma Gl. Chemical weed control in spring groundnut. Indian J. Weed Sci., 1997; 29(1, 2):34-38.
10. Sumathi V, Chandrika V, Muneendra Babu A, Nagarani V. Integrated weed management in groundnut (*Arachis hypogaea* L.). *Indian J. Agron.*, 2000; 45(4):765-770.