International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2017; 5(2): 212-214

Received: 06-01-2017
Accepted: 07-02-2017

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Effect of weed management on growth attributes and yield of summer groundnut (*Arachis hypogaea* L.)

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Abstract
An experiment was conducted to assess the effect of weed management on growth attributes and yield of summer groundnut (*Arachis hypogaea* L.) during summer, 2015 at the Department of Agronomy, College of Agriculture, JAU, Junagadh. The results of experiment indicated that growth parameters *viz*., plant height, dry matter accumulation at 60, 90 DAS and at harvest and nodules per plant (total and effective) at 60 DAS significantly higher under weed free. Significantly higher pod yield, haulm yield and biological yield under weed free.

Keywords: Herbicide, groundnut, growth and yield

1. Introduction
Groundnut (*Arachis hypogaea* L.) is an important oilseed crop of India, occupying about 24 M ha of land in about 120 countries under different agro-climatic zones between 40^0S and 40^0N (DGR, 2013). 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) [4]. Weeds are potential competitors with crops for nutrients, moisture, light and space. Control of weeds particularly in cropping system is vitally important not only to check the loss caused by them, but also to increase the efficiency of the applied fertilizers. Nutrient availability to crop can be increased by controlling the weeds (Devakumar and Gajendra Giri, 1999) [2]. The present investigation was therefore carried out to assess the losses caused by weeds and the extent to which these losses would be minimised by use of herbicides alone or in combination with cultural methods and their effect on crop yield.

Materials and Methods
The field experiment entitled **"**effect of weed management on growth attributes and yield of summer groundnut (*Arachis hypogaea* L.)**"** was conducted during summer 2015 at Instructional Farm, Department of Agronomy, Junagadh Agricultural University, Junagadh (Gujarat), which is situated in South Saurashtra Agro-climatic region of Gujarat state and enjoys a typically subtropical climate characterized by fairly cold and dry winter, hot and dry summer as well as warm and moderately humid monsoon. Which is situated at 221.5^0 N latitude and 70.5^0 E longitudes with an altitude of 60 m above the mean sea level. The soil was clayey in texture and slightly alkaline in reaction with pH 7.9 and EC 0.33 dS m^{-1}. The soil was low in available nitrogen (237.0 kg ha^{-1}), medium in available phosphorus (22.5 kg ha^{-1}) and high in potassium (284.0 kg ha^{-1}). Total ten treatment combinations *viz.,* weedy check (T_1), hand weeding twice at 20 and 45 DAS (T_2), weed free (T_3), pendimethalin @ 0.9 kg ha^{-1} as pre-emergence(T_4), oxyfluorfen @ 0.24 kg ha^{-1} as pre-emergence (T_5), imazethapyr @ 0.07 kg ha^{-1} as post-emergence at 20 DAS (T_6), premix sodium acifluorfen + clodinofop proprigyl @ 0.25 kg ha^{-1} as post-emergence at 20 DAS (T_7), premix imazethapyr + imazamox @ 0.100 kg ha^{-1} as post-emergence at 20 DAS (T_8), quizalofop-*p*-ethyl @ 0.04 kg ha^{-1} as post-emergence at 20 DAS +1 hand weeding at 45 DAS(T_9) oxyfluorfen @ 0.24 kg ha^{-1} as pre-emergence followed by imazethapyr @ 0.07 kg ha^{-1} as post-emergence at 20 DAS + 1 hand weeding at 45 DAS (T_{10}) were tested in a randomized block design (RBD) with three

repetitions. The crop was sown in 30 cm × 10 cm spacing with seed rate of 120 kg/ha. The variety GJG-31 was shown on 7th February and recommended dose of fertilizer was 25-50-50 N-P-K kg ha^{-1} and all other recommended practices were adopted according to as per needed of crop requirement. Statistical analysis of the individual data of various characters studied in the experiment was carried out using standard statistical procedures as described by Panse and Sukhatme (1985) [6]. Standard error of mean, critical difference (C.D.) at 5 per cent level of probability and coefficient of variance were worked out for the interpretation of the results.

Result and Discussion

Effect on growth attributes

An appraisal of data (Table 1) showed that various weed management practices significantly influenced growth attributes of groundnut. Significantly higher values of growth attributes *viz*., plant height at harvest, dry matter accumulation at 60 and 90 DAS and at harvest and number of nodules $plant^{-1}$ (total and effective) at 60 DAS were observed under weed free (T_3), which remained statistically at par with HW twice at 20 & 45 DAS (T_2), pendimethalin @ 0.9 kg ha^{-1} as pre-emergence (T_4), quizalofop-*p*-ethyl @ 0.04 kg ha^{-1} as post-emergence at 20 DAS + 1 HW at 45 DAS (T_9) and oxyfluorfen @ 0.24 kg ha^{-1} as pre-emergence *fb* imazethapyr @ 0.07 kg ha^{-1} as post-emergence at 20 DAS + 1 HW at 45 DAS (T_{10}). Significantly the lowest values of growth parameters were observed under weedy check (T_1). Periodical removal of weeds by hand weeding and interculturing or herbicide application supplemented with weeding and interculturing suppressed weeds, which in turn provided better weed free environment to the crop during critical period for growth and development. These finding are in agreement with those of Pandian and Nambi (2002) [5], Solanki *et al*. (2005) [9] and Walia *et al.* (2007) [10].

Effect on yield

The data (Table 2) indicated that different weed management treatments exerted significant effect on pod, haulm and biological yield. Significantly higher pod (1768 kg ha^{-1}), haulm (2606 kg ha^{-1}) and biological yield (4374 kg ha^{-1}) were registered under weed free (T_3), which remained statistically at par with HW twice at 20 & 45 DAS (T_2), pendimethalin @ 0.9 kg ha^{-1} as pre-emergence (T_4), quizalofop-*p*-ethyl @ 0.04 kg ha^{-1} as post-emergence at 20 DAS + 1 HW at 45 DAS (T_9) and oxyfluorfen @ 0.24 kg ha^{-1} as pre-emergence *fb* imazethapyr @ 0.07 kg ha^{-1} as post-emergence at 20 DAS + 1 HW at 45 DAS (T_{10}). However, significantly lowest yield were recorded under treatment weedy check (T_1). Analogous findings have been reported by Patel *et al.* (2013) [7] and Mahatale *et al.* (2014) [3].

Table 1: Effect of different treatments on growth parameters in groundnut

Treatment	Plant height (cm)	Dry matter accumulation per plant (g)			Nodules per plant at 60 DAS	
		60 DAS	90 DAS	At harvest	Total nodules	Effective nodules
T_1- Weedy check	19.75	9.96	12.79	16.62	60.00	35.33
T_2- Hand weeding twice (20 and 45 DAS)	24.60	13.74	19.74	27.67	87.33	76.33
T_3- Weed free	26.46	14.65	20.71	29.65	89.33	78.00
T_4- Pendimethalin @ 0.9 kg ha^{-1} as PE	24.18	13.27	18.56	25.80	86.33	75.33
T_5- Oxyfluorfen @ 0.24 kg ha^{-1} as PE	23.56	12.26	17.51	24.13	82.67	71.00
T_6- Imazethapyr @ 0.07 kg ha^{-1} as POE at 20 DAS	23.64	12.62	18.26	25.61	82.50	72.00
T_7- Premix Sodium Acifluorfen + Clodinofop Proprigyl @ 0.25 kg ha^{-1}as POE at 20 DAS	22.62	12.02	17.01	23.28	79.33	69.33
T_8- Premix Imazethapyr + Imazamox @ 0.100 kg ha^{-1}as POE at 20 DAS	23.70	12.69	18.36	25.74	83.00	68.67
T_9- Quizalofop-p-ethyl @ 0.04 kg ha^{-1} as POE at 20 DAS + 1 HW at 45 DAS	23.94	12.95	18.88	27.22	84.67	73.67
T_{10}- Oxyfluorfen @ 0.24 kg ha^{-1} as PE *fb* Imazethapyr @ 0.07 kg ha^{-1}as POE at 20 DAS + 1 HW at 45 DAS	23.80	12.79	18.72	27.25	83.67	73.33
S.Em.±	1.02	0.80	0.98	1.28	2.41	2.06
C. D. at 5%	2.14	1.68	2.06	2.70	5.07	4.33
C. V. %	5.30	7.72	6.68	6.23	3.61	3.65

Table 2: Effect of different treatments on pod, haulm and biological yield of groundnut

Treatment	Pod yield (kg ha^{-1})	Haulm yield (kg ha^{1})	Biological Yield (kg ha^{-1})
T_1- Weedy check	778	1063	1841
T_2- Hand weeding twice (20 and 45 DAS)	1593	2434	4027
T_3- Weed free	1768	2606	4374
T_4- Pendimethalin @ 0.9 kg ha^{-1} as PE	1518	2313	3831
T_5- Oxyfluorfen @ 0.24 kg ha^{-1} as PE	1545	2179	3725
T_6- Imazethapyr @ 0.07 kg ha^{-1} as POE at 20 DAS	1437	2215	3652
T_7- Premix Sodium Acifluorfen + Clodinofop Proprigyl @ 0.25 kg ha^{-1}as POE at 20 DAS	1347	2165	3513
T_8- Premix Imazethapyr + Imazamox @ 0.100 kg ha^{-1} as POE at 20 DAS	1366	2236	3602
T_9- Quizalofop-*p*-ethyl @ 0.04 kg ha^{-1} as POE at 20 DAS + 1 HW at 45 DAS	1675	2377	4053
T_{10}- Oxyfluorfen @ 0.24 kg ha^{-1} as PE *fb* Imazethapyr @ 0.07 kg ha^{-1}as POE at 20 DAS + 1 HW at 45 DAS	1716	2504	4220
S.Em.±	110	132	161
C. D. at 5%	230	276	338
C. V. %	9.10	7.29	5.35

Conclusion

Based on the results of one year experimentation, it seems quite logical to conclude that potential production, profit and effective weed management in summer groundnut under South Saurashtra Agro-climatic Zone can be achieved by conventional methods *i.e.* weed free condition where farm labours are easily available. Alternatively integrated weed management method including quizalofop-*p*-ethyl @ 0.04 kg ha^{-1} as post emergence at 20 DAS + 1 HW at 45 DAS and oxyfluorfen @ 0.24 kg ha^{-1} as pre-emergence *fb* imazethapyr @ 0.07 kg ha^{-1} as post emergence at 20 DAS + 1 HW at 45 DAS.

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