



Agronomic Management In Rabi Groundnut For Higher And Quality Yield

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ABSTRACT

Field experiments were conducted during two consecutive *rabi* seasons of 2008 and 2009 on sandy clay loam soils of S.V. Agricultural College, Tirupati campus of ANGRAU, to develop certain agro-techniques for enhancing the productivity and quality of export oriented groundnut. The experiment was laid out in a split - spit plot design and replicated thrice. It consisted of three planting patterns viz., 22.5 x 10 cm (P_1), 30.0 cm x 10 cm (P_2) and 37.5 x 10 cm (P_3) as main plots, four nitrogen management practices viz., 100% N through urea (N_1), 100% N through poultry manure (N_2), 50% N through fertilizer + 50% N through poultry manure (N_3) and 25% N through urea + 75% N through poultry manure (N_4) as sub plots and four weed management practices viz., Two hand weeding at 20 and 40 DAS (W_1), Pre-emergence application of pendimethalin @ 1.0 kg a.i ha⁻¹ + one hand weeding at 40 DAS (W_2), Post emergence application of quizalofop -p-ethyl @ 54 g a.i ha⁻¹ at 20 DAS + hand weeding at 40 DAS (W_3) and Pre-emergence application of pendimethalin @ 1.0 kg a.i ha⁻¹ + post emergence application of quizalofop -p-ethyl @ 54 g a.i ha⁻¹ at 40 DAS (W_4) as sub-sub plots. The results revealed that sowing groundnut with planting pattern of 22.5 x 10 cm and application of 30kg N ha⁻¹ @ 50 per cent each through urea and poultry manure along with hand weeding twice at 20 and 40 DAS is essential for obtaining higher yield with better quality and remunerative monetary returns.

Key words: Groundnut, Hand weeding, Nitrogen, Planting pattern.

Andhra Pradesh is one of the leading groundnut producing states in India, particularly during *rabi*, with an area, production and productivity of 2.64 lakh ha, 5.07 lakh tonnes and 1921 kg ha⁻¹, respectively. Though, groundnut is the leading oilseed crop of India and Andhra Pradesh, it is slowly gaining importance for confectionery and snack food purpose in domestic and international markets in recent years. The growth rate of the international market for confectionery groundnut has been increasing at an average of 2.2% per annum since 1980's.

The quality requirement of confectionery groundnut is more stringent and distinctly different from groundnut for oil. Kernels of bold size with high protein, high oleic acid/linoleic acid (O/L) ratio and low oil are preferred for export. To meet the export standards, besides the size of kernel, certain quality parameters also assume importance, which may be attained by proper agronomic manipulation.

MATERIAL AND METHODS

The study was laid out in split-split plot design and replicated thrice. The groundnut cv. Bheema (TG-49) was used. The sowing was done on first crop on 02-12-2008 and second crop on 21-11-2009 and harvesting was done on 24-03-2009 and second crop

on 13-03-210. The number of irrigations given were eight for first crop and six for second crop. The initial fertility status was available nitrogen 153, phosphorus 25.7 and potassium 76 kg⁻¹ ha. It consisted of three planting patterns viz., 22.5 x 10 cm (P_1), 30.0 x 10 cm (P_2) and 37.5 x 10 cm (P_3) as main plots, four nitrogen management practices viz., 100% N through urea (N_1), 100% N through poultry manure (N_2), 50% N through urea + 50% N through poultry manure (N_3) and 25% N through urea + 75% N through poultry manure (N_4) as sub plots and four weed management practices viz., Two hand weeding at 20 and 40 DAS (W_1), Pre-emergence application of pendimethalin @ 1.0 kg a.i ha⁻¹ + one hand weeding at 40 DAS (W_2), Post emergence application of quizalofop -p-ethyl @ 54 g a.i ha⁻¹ at 20 DAS + hand weeding at 40 DAS (W_3) and Pre-emergence application of pendimethalin @ 1.0 kg a.i ha⁻¹ + post emergence application of quizalofop -p-ethyl @ 54 g a.i ha⁻¹ at 40 DAS (W_4) as sub-sub plots.

RESULTS AND DISCUSSION

Influence Of Different Planting Pattern

Pod and haulm yield of groundnut were the highest with the planting pattern of 22.5 x 10 cm,

Table 1. Yield and Economics of Export oriented groundnut as influenced by different planting pattern, Nitrogen and weed management practices, average of two years

Treatments	Pod yield (kg ha ⁻¹)	Haulam yield (kg ha ⁻¹)	Harvest Index (%)	Net returns (Rs./ha)	B : C ratio
Planting pattern					
P1:22.5x10.0 cm	3690	5926	45.01	77092	5.81
P2:30.0x10.0 cm	3617	5423	41.23	74049	5.31
P3:37.5x10.0 cm	3292	4131	38.40	63660	4.31
CD (P=0.05)	11.8	395	2.03	2891	0.17
Interaction	Nil	Nil	Nil	Nil	Nil
Nitrogen Management					
N1: 100%N through urea (F)	3532	5156	42.35	71890	5.07
N2: 100%N through poultry manure (PM)	3552	5445	41.13	71716	5.19
N3: 50%N through F + 50%N PM	3552	5591	43.25	72108	5.33
N4: 25%N through F + 75%N PM	3495	4447	39.45	70686	4.99
CD (P=0.05)	87	508	2.39	NS	0.12
Interaction	Nil	Nil	Nil	Nil	Nil
Weed managements					
W1: Two hand weeding at 20 and40 DAS	3627	5566	43.77	74386	5.41
W2: Pendimethalin @ 1.0 kg a.i + HW at 40 DAS	3566	5284	41.08	72638	5.25
W3: Quizilofop – P-ethyl @ 54 g a.i ha ⁻¹ + HW at 40 DAS	3551	5083	41.8	71847	5.11
W4: Pendimethalin @ 1.0 kg a.i ha ⁻¹ +Quizilofop – P-ethyl @ 54 g a.i	3388	4706	39.55	67529	4.82
CD (P=0.05) W	49	981	2.04	1226	0.07
Interaction	Nil	Nil	Nil	Nil	Nil

which were comparable with planting pattern of 30x10 cm . Higher yield with closer planting pattern was the cumulative effect of more number of plants per unit area even with lesser number of filled pods per each plant. However 30x10 cm spacing might be the optimum planting pattern for the production of sound pods contributing for comparable pod yield with closest planting in the study. The lowest yield was recorded with widest planting, though pod production per plant was higher, because total number of plants per unit area was far lesser than with closer planting. Optimum planting pattern is the prerequisite for proper utilization of growth resources and ultimately to exploit the potential productivity of any crop. Similar results were reported by several earlier workers in groundnut (Ramesh and Sabalem 2001, Kathirvelan and Kalaiselan, 2007)(Table 1).

Influence Of Different Nitrogen Management Practices

Yield, and economics were found to be highest with application of 50% N each through urea and poultry manure ,which were comparable with 100% N through poultry manure and in turn were in parity with supply of 100% N through urea, while all of them were at their lowest with application of 25% N through urea and 75% N through poultry manure . Post harvest soil available nutrient status was exactly in the reverse trend to the above parameters.

In the present study, uniform dose of 30 kg N ha⁻¹ was supplied through different proportions of two sources, one each of organic and inorganic to four different treatments as mentioned above along with uniform dose of 40 kg P₂O₅ and 50 kg K₂O ha⁻¹ through fertilisers to all the treatments. Since the organic source was poultry manure, differential

Table 2. Quality Parameters of Export oriented groundnut as influenced by different planting pattern, Nitrogen and weed management practices.

Treatments	Protein content		Oil content		Sucrose content		Aflatoxin content	
	Rabi,2008	Rabi, 2009	Rabi,2008	Rabi, 2009	Rabi,2008	Rabi, 2009	Rabi,2008	Rabi, 2009
Planting pattern								
P1:22.5cmx10.0 cm	25.96	26.51	45.93	46.46	7.09	7.17	0.48(0.88)	0.33(0.84)
P2:30.0cmx10.0 cm	25.99	26.45	46.54	46.38	7.12	7.22	0.00(0.71)	0.21(0.79)
P3:37.5cmx10.0 cm	25.93	26.41	45.17	46.76	7.06	7.14	0.94(1.00)	0.03(0.72)
CD (P=0.05) P	NS	NS	NS	NS	NS	NS	NS	NS
Nitrogen Management								
N1: 100%N through fertilizer (F)	25.92	26.44	46.78	46.21	7.06	7.09	1.24(1.11)	0.47(0.90)
N2: 100%N through poultry Manure (PM)	26.0	26.45	46.59	46.70	7.13	7.25	0.12(0.76)	0.00(0.71)
N3: 50%N through F + 50%N PM	26.0	26.55	46.63	46.53	7.07	7.18	0.53(0.87)	0.28(0.81)
N4: 25%N through F + 75%N PM	25.93	26.38	46.19	46.70	7.10	7.19	0.00(0.71)	0.00(0.71)
CD (P=0.05) N	NS	NS	NS	NS	NS	NS	NS	NS
Weed managements								
W1: two hand weeding at 20 &40 DAS	25.88	26.49	46.71	46.66	7.05	7.07	0.61(0.88)	0.20(0.79)
W2: Pendimethalin @ 0.1 kg a.i + HW at 40 DAS	25.97	26.38	46.56	46.55	6.98	7.20	0.88(0.99)	0.52(0.91)
W3: Quizilofop – P-ethyl @ 54 g a.i ha ⁻¹ + HW at 40 DAS	26.07	26.49	46.33	46.54	7.22	7.21	0.12(0.76)	0.00(0.71)
W4: Pendimethalin @ 0.1 kg a.i ha ⁻¹ +Quizilofop – P-ethyl @ 54 g a.i	25.93	26.45	46.58	46.39	7.12	7.23	0.28(0.81)	0.03(0.73)
CD (P=0.05) W	NS	NS	NS	NS	NS	NS	NS	NS

(Values in parenthesis are transformed values)

quantities of P and K happened to be supplied to the four treatments tried, though N was supplied on equal nutrient basis. This has manifested variable effects on the performance of groundnut. It is an universal fact that in plant nutrition, different sources of the same nutrient often extend variable influence on the outcome of any crop. The same thing was exhibited in the present investigation, during the two years, without any altered trend. As regards the crop performance, excelled stature of growth parameters led to improved yield structure and thereby the yield and monetary returns.

The study has also left a clue of course, for further verification and fine tuning, that mineral N could be avoided by 50 per cent by substituting with an effective organic N source. The possibility of supply of total extent of N through organic source alone has also been hinted by the study. Productivity of groundnut with the above said two options was nothing lesser than with 100 per cent of N through mineral fertilizers. The former options would address the much talked about sustainability concept. However, for the immediate time being an integrated approach of plant nutrition satisfies both the farmer and the environment, as evident from the present investigation. Equality or betterment of integrated nutrition crops with trend of exploitive farming has been adequately documented by previous researchers (Shankaranarayana *et al.*, 2004, Ananda, 2006 and Kadalli *et al.* 2006).

Influence Of Different Weed Management Practices

The present study has revealed that two hand weeding at 20 and 40 DAS resulted in the best performance of groundnut and better than with integrated practices of physical and chemical methods or combination of pre and post emergence herbicides. Though the results confirm those of Kadavkar *et al.*, (2004) and Virender Sardana *et al.* (2006), the time tested and promising practice of a couple of soil stirring weeding techniques appears to be distant reality during recent times, especially due to non-availability of labour for timely weeding due to an array of reasons. Inconclusive arguments are still going on between divided groups of scientific community that time has come for total reliance on herbicides for effective checking of weeds in groundnut and at least one manual weeding should find place in the weed management package. Though both the schools of thought have their respective positive SWOT analysis proofs, it appears that the latter preaching seems to be promising for obvious reasons. Accordingly, the next best weed

management practice to hand weeding twice could be integrated approach of pre-emergence low volume herbicide followed by manual manipulation around 20 – 25 DAS. Such successful recommendations have been made by Dharkar *et al.*, (2000), Gowda *et al.*, (2002) and Walia *et al.*, (2007). As regards the crop performance under the influence of different weed management practices, excelled stature of growth parameters led to improved yield structure and thereby the yield and monetary returns .

Quality Parameters

Protein content, Oil content, sucrose and Aflatoxin content of groundnut kernels was not significantly influenced by different planting patterns, nitrogen and weed management practices tried during both the years of study (Table 2).

Conclusion

The results revealed that sowing groundnut with planting pattern of 22.5 x 10 cm and application of 30kg N ha⁻¹ @ 50 per cent each through urea and poultry manure along with hand weeding twice at 20 and 40 DAS is essential for obtaining higher yield with better quality and remunerative monetary returns.

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