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Nutrient management in groundnut through farmers participatory approach

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ABSTRACT : On-farm demonstrations were conducted in 25 villages with an area of 20 hectares during *Kharif* season over a period of 5 years from 2008-09 to 2012-13. The results revealed that growth parameters like plant height, number of pods per plant, hundred pod weight, hundred kernel weight were improved with the use of soil test based fertilizer application compared to farmers practice. Pod yield of groundnut was increased by 11 per cent due to soil test based fertilizer application. A saving of Rs. 1,253/- (Rupees one thousand two hundred and fifty three only) per hectare was realized due to soil test based fertilizer application alone besides increasing pod yield of groundnut. Gross returns were more with soil test based fertilizer application (Rs. 21,371/- per hectare) compared to farmers practice (Rs. 19,105/- per hectare). The net returns of groundnut from soil test based fertilizer application were higher (Rs. 6,918 ha^{-1}) than farmers practice (Rs. 3,399/- ha^{-1}). Simultaneously Cost Benefit ratio was higher with soil test based fertilizer application compared to farmers practice because of lower cost of cultivation and improved yield. Fertilizer application to rainfed groundnut based on soil test values was found more promising in not only reducing cost of cultivation, but also improving the net returns to rainfed groundnut farmer.

KEY **W**ORDS : Groundnut, Soil test based fertilizer application, Rainfed soils

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Groundnut is the major oilseed crop cultivated in an area of 7.5 lakh hectares in Anantapuram district of Andhra Pradesh under rainfed conditions with an average productivity of 400 kg ha^{-1} (Anonymous, 2012). This area is a traditional groundnut growing belt where the farmers used to grow long duration spreading groundnut varieties since 35 years, with introduction of bunch varieties like TMV-2 and JL-24 farmers started application of chemical fertilizers like diammonium phosphate (DAP) which is a high analysis phosphorus fertilizer (18 – 46 – 0) since then the farmers of Anantapuram district are in practice of applying 50 kg of DAP per one acre of groundnut crop as a basal application. This practice of DAP application did not bring any significant variation in groundnut yields and lead to the built up of phosphorus in the soil and high cost of cultivation.

The results of permanent manurial trial conducted at Agricultural Research Station, Anantapuram from 1985 to 2013 revealed that there was a buildup of phosphorus due to continuous application of phosphatic fertilizers to groundnut crop. The depletion studies in the same experiment further revealed that the pod yields of groundnut were not significantly influenced due to non-application of phosphatic fertilizers to groundnut for the last 20 years (Annual Report, 2012). Based on the results of long term manurial trail, systematic soil survey was conducted in different villages of Anantapuram district,

the survey revealed that there was phosphorus build up to the tune of 30 per cent and depletion of available potassium upto 25 per cent in groundnut growing fields due to continuous application of diammonium phosphate fertilizer. The results of soil test analysis are depicted in Fig A.

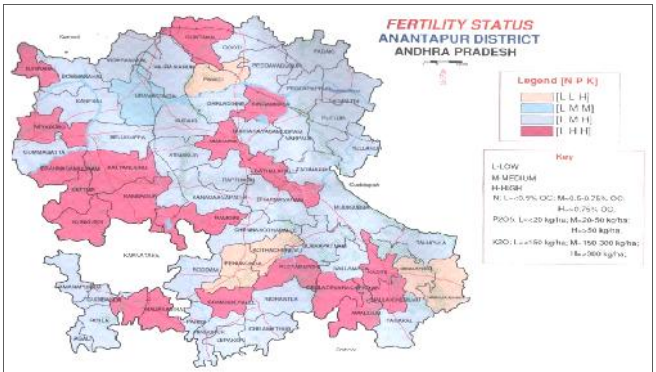

Fig. A : Fertility status of Anantapuram district

Based on results of long term permanent manurial trial and soil survey, soil test based fertilizer application has been developed for groundnut crop to reduce cost of cultivation. Phosphorus and potassium fertilizers were applied in full dose if soil test values were low and half of the recommended dose if soil test values were medium and no fertilizer if the soils contain high value of P and K. Validation of soil test based fertilizer adjustment equation on targeted yield was found more precise for different crops according to Verma *et al*. (2005) who observed that if a particular nutrient in soil was found low fertilizer dose for that nutrient would be high and if fertility status was high the generalized fertilizer dose decreased by 25 per cent.

Considering the above points, on-farm demonstrations were conducted to popularize the soil test based fertilizer application among the farmers, feasibility of soil test based fertilizer application was done under supervision of DAATT Center (Extension unit of Acharya N.G. Ranga Agricultural University, Andhra Pradesh), Anantapuram for five years during *Kharif*, 2008-09 to 2012-13. The comparison was made between soil test based fertilizer application and farmers practice with an objective to reduce the cost of production of groundnut and subsequently improve the returns from unit in farmers' fields.

RESEARCH PROCEDURE

Twenty five on-farm demonstrations were conducted to popularize benefits of soil test based fertilizer application on yield components, yield and economics of groundnut in twenty five villages of Anantapuram district with an area of 20.0 hectares during *Kharif* season over a period of 5 years from 2008-09 to 2012-13 (Table A). The treatments consisted of T_1: Soil test based fertilizer application and T_2: Farmers practice. Plot size for each treatment of on-farm demonstration was 4000 m^2. In each year of on-farm demonstration soil samples were collected from farmer's fields and analyzed at Krishi Vigyan Kendra, Reddipalli (Anantapuram district). The soil analysis revealed that pH varied from 6.1 to 8.3, EC ranged from 0.05 to 0.49 dS m^{-1}, organic carbon was 0.05 to 0.38 per cent, available nitrogen was low in all the samples, available phosphorus was medium to high (36.2 to 67.2 kg ha^{-1}) and available potassium was low to medium (71 to 285 kg ha^{-1}). Groundnut variety K-6 of 110 - 115 days duration was sown with spacing of 30 cm x 10 cm on flat beds. The seeds of groundnut were treated with imidachloprid @ 2ml and mancozeb @ 3 g/ kg seeds before sowing. In soil test based fertilizer application treatment fertilizers were applied according to soil test results (Recommended dose of fertilizer is 20-40-40 kg N, P and K/ha). During entire period of demonstration nitrogen was low in all soil samples, hence full recommended dose of nitrogen was applied at the time of sowing. If the phosphorus and potassium nutrient status was medium half of the recommended dose of fertilizers were applied at the time of sowing. No fertilizers were

Table A : Details of on-farm demonstrations

Sr. No.	Year	No. of villages	No. of locations	Area (ha)
1.	2008-09	5	5	4.0
2.	2009-10	5	5	4.0
3.	2010-11	5	5	4.0
4.	2011-12	5	5	4.0
5.	2012-13	5	5	4.0
	Total	25	25	20.0

applied if their status was high. In farmers practice 150 kg DAP per ha^{-1} was applied. Weed control was achieved by manual weeding with danthulu twice at 20 and 40 DAS. The crop was harvested at 125 days after sowing (DAS). At harvest ten plants were randomly selected from each treatment for recording growth parameters such as plant height (cm), number of pods/ plant, 100 pod weight and 100 seed weight. At harvest in each treatment pod and haulm yield from the net plot (5 m x 5 m) was recorded. Both treatments received uniform plant protection and cultural management practices throughout the period of crop growth. Labour charges, cost of inputs were worked out to compute the cost of cultivation. Gross returns were calculated based on local market prices of chickpea and net returns by subtracting the total cost of cultivation from gross returns. Benefit cost ratio was computed by dividing gross returns with cost of cultivation.

RESEARCH ANALYSIS AND REASONING

The results of the on-farm demonstrations on response of groundnut to soil test based fertilizer application in comparison with farmers practice were given Table 2. The results revealed that growth parameters like plant height, number of pods per plant, hundred pod weight, hundred seed weight of groundnut were improved by soil test based fertilizer application compared to farmers practice.

Growth and yield attributes :

Higher plant height of 24.9 cm was recorded with soil test based fertilizer application compared to farmers practice (22.4 cm). There were more number of pods per plant (8.6) in soil test based fertilizer application as compared to 8.1 pods in farmers practice. Higher 100 pod weight of 54.2 g was recorded with soil test based

Table 1 : Fertilizer recommendation for rainfed groundnut based on soil test values

Nutrient	Soil test value (kg ha^{-1})	Dose to be applied (kg ha^{-1})
Phosphorus (P_2O_5)		
Low	<20	40
Medium	20-50	20
High	>50	Nil
Potassium (K_2O)		
Low	<150	40
Medium	150-300	20
High	>300	Nil

Table 2: Pod yield of groundnut as influenced by soil test based fertilizer application (Mean of 5 years data)

Sr. No.	Particulars	STBF	Farmers practice
1.	Soil test results	N – Low P – Low to High K – Low to medium	---
2.	Fertilizer applied (kg ha^{-1})	As per soil test results	DAP – 125
3.	Cost of fertilizer (Rs. ha^{-1})	776	2777
4.	Saving on fertilizer cost (Rs. ha^{-1})	2001	--
5.	Plant height (cm)	24.9	22.4
6.	No. of pods per plant	8.6	8.1
7.	100 pod weight (g)	54.2	50.5
8.	100 seed weight (g)	22.5	20.5
9.	Pod yield (kg ha^{-1})	784	702
10.	Haulm yield (kg ha^{-1})	1996	2095
11.	Cost of cultivation (Rs. ha^{-1})	14453	16453
12.	Gross returns (Rs. ha^{-1})	25872	23166
13.	Net returns (Rs. ha^{-1})	11419	6713
14.	B:C ratio	1.8	1.4

fertilizer application compared to farmers practice (50.5 g). Similarly higher 100 seed weight of 22.5 g was recorded with soil test based fertilizer application compared to farmers practice (20.5 g). Due to soil test based fertilizer application plant height, number of pods per plant, 100 pod weight and 100 seed weight were increased by 11.2, 6.2, 7.3 and 9.8 per cent, respectively over farmers practice.

Pod yield :

Soil test based fertilizer application recorded higher pod yield (784 kg ha^{-1}) which was 11.7 per cent higher over farmers practice (702 kg ha^{-1}). Higher number of pods per plant, 100 pod weight and 100 seed weight might be the reason behind the yield increase in soil test based fertilizer application treatment. Srinivasa *et al*. (2010) reported positive response of groundnut to balanced fertilization. Further improved package of practices such as improved varieties of crops, balanced use of fertilizers, timely sowing, etc, increased the yield of crops by 115.9 per cent over traditional practices. Watershed development treatments such as improved package of practices, balanced use of fertilizer, graded bunds, gully control structures etc., halted the process of land degradation and improved ground water recharge which could be successfully exploited for increasing the productivity of arable lands (Prasad *et al*., 1997).

Economics :

Gross returns (Rs.25,872/-) and net returns (Rs. 11,419/-) per hectare were more with soil test based fertilizer application compared to farmers practice (Rs. 23,166/- gross returns and Rs. 6,713/- net returns). This was due to higher pod yield with soil test based fertilizer application. Higher gross returns of Rs.2,706/- per hectare was obtained with soil test based fertilizer application due to higher pod yield compared to farmers practice. The cost of cultivation was comparatively high in farmers practice compared to soil test based fertilizer application. A saving of Rs. 2,001/- (Rupees two thousand and one only) on cost of fertilizers per hectare was realized due to soil test based fertilizer application alone besides increasing pod yield of groundnut. This might be due to application of fertilizers as per farmers choice without soil testing and high cost of DAP fertilizer. This cost was reduced in treatment soil test based fertilizer application by applying limited quantity fertilizers as per soil test values. Simultaneously cost benefit ratio was higher with soil test based fertilizer application (1:1.8) compared to farmers practice (1:1.4) because of lower cost of cultivation and improved yield with soil test based fertilizer application. In soil test based fertilizer application cost of cultivation was reduced by 12.2 per cent whereas, gross returns and net returns were improved by 11.7 and 70.1 per cent, respectively over farmers practice. Bhargavi *et al*. (2006) reported similar results in groundnut cultivation with soil test based fertilizer application in rainfed situation.

Considering the present condition of high cost of fertilizer soil test based fertilizer application proved economically feasible nutrient management for groundnut. Fertilizer application to rainfed groundnut based on soil test values was found more promising in not only reducing cost of cultivation, but also improving the net returns to rainfed groundnut farmer.

LITERATURE CITED

Anonymous (2012). Ananthapuram District Statistics pp. 18 – 23

Annual Report (2012). Agricultural Research Station, Anantapuram (A.P.) INDIA.

Bhargavi, K., Padmalatha, Y. and Vijaya Sankara babu, M. (2006). Nutrient management of groundnut through farmers participatory approach. National Symposium on conservation Agriculture and Envinronment, October 26-28, 2006 BHU, Varanasi.

Prasad, S.N., Singh, Ratan, Chandra Prakash Rao, H., Gadekar, H., Katiyal, V. S. Prasad, Arjun and Raghupathy, R. (1997). Impact of watershed management on runoff, water resource development and productivity of arable lands in southern eastern Rajasthan. *I. J. Soil Cons.*, **25** (1): 68-72.

Srinivasa, Rao, C.H., Vittal, Kundu, K.P.R., S., Gajbhiye, P.N. and Vijaya Sankar Babu, M. (2010). Twenty years of continuous cropping fertilization and organic manure application effects on forms of potassium and kinetics of Non exchangeable K release in the profile of an alfisol under arid conditions. *Communi. Soil Sci. & Plant Analysis*, **41**(6): 783-796

Verma, T.S., Suri, V.K., Sanjeev, Sandal, K. and Jaipal (2005). Validation of soil test based fertilizer adjustment equation on targeted yield in wet temperature area of Himachal Pradesh. *J. Agric. Sci.*, **75** (10): 654 – 657.