



MAXIMIZATION OF GROUNDNUT (*Arachis hypogaea* L) YIELD BY NUTRIENT MANAGEMENT PRACTICES

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KEYWORDS

Arachis hypogaea

Yield

Treatments

Nutrient management

BC ratio

ABSTRACT

Present study was carried out for finding the effect of nutrient management on the yield of the groundnut. The study was formulated in RCBD with 10 treatments and 4 replicates each. Results of the present investigation revealed a significant difference with respect of pod yield for all the studied treatments. Among the different treatments, highest pod yield was recorded by the treatment RDF (100% as basal dose) + FYM (7.5 t/ha) 2169 kg/ha with BC ratio 1:5.45 this improvement was followed by treatment RDF (100% as basal dose) + RDF (50% as top Dressing at 30 DAS) + FYM (7.5 t/ha) 2006 kg/ha, 1:4.66 BC ratio and RDF (100% as basal dose) 1966 kg/ha, BC ratio 1:4.59 and lowest yield recorded by RDF (75% as basal dose) + RDF (75% as top Dressing at 30 DAS) 1721 kg/ha, BC ratio 1:4.58.

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1 Introduction

Groundnut or peanut (*Arachis hypogaea* L.) is also known as a 'King' of oilseed (Priya et al., 2013) belongs to family Fabaceae. This is also known by various names such as earthnuts, peanuts, goober peas, pindas, jack nuts, pinders, manila nuts, g-nuts and monkey nuts (Annadurai & Palaniappan, 1994). Groundnut is an important oilseed crop of India, cultivated in various parts of the country. Among the various agronomic practices, nutrient management has an important role in maximizing the pod yield. Judicial use of fertilizers is necessary for increasing agricultural production and reduced environmental pollution because continuous use of chemical fertilizers has deleterious effects on soil which in turn cause decline in productivity. Furthermore it caused low nutrient recovery and increase in cost of production and environmental pollution (Sarkar et al., 1997). The optimization of the mineral nutrition has key role in optimization the production of groundnut because it has very high nutrient requirement. On contrary groundnut farmers use very less fertilizer resulting in severe mineral nutrient deficiencies due to inadequate and imbalance use of nutrients is one of the major factors responsible for low yield in groundnut (Veermani & Subrahmanyan, 2011). Thus it is high time to look into the mineral nutrition aspects of groundnut for achieving high yield and advocate the suitable package of practices for optimization of yield (Singh, 2004). Keeping in view the above facts, the present investigation was aimed to maximize the yield in groundnut through nutrient management practices.

2 Materials and Methods

Field experiment was conducted on Groundnut cv. GG-2 at Regional Rice Research Station, NAU, Vyara (Gujarat), India during three consecutive summer seasons from 2010 to 2012. The available nutrient in the soil at the initiation of trial is presented in table 1. Total ten treatments were tested in randomized complete block design with four replications (Table 2). Groundnut was sown @ 120 kg seed/ha in rows 30 cm apart and 10 cm plant to plant spacing. Initially recommended dose (25:50:00 NPK) of fertilizer were applied, as a source of nitrogen, urea was applied while as a source of phosphorus DAP was used during all the three years of study. All other treatments were imposed as per the schedule and methodologies given below.

3 Results and Discussion

Different fertilizer combination had a significant effect on pod yield of groundnut. The data presented in Table 3 revealed that the pod yield (kg/ha) was highest (2169 kg) in the combination of RDF (100%) + FYM (7.5t/ha) which indicated that the yield components of summer groundnut like 100 pod weight, 100 kernel weight and shelling per cent were also increased as compared to the recommended dose of fertilizer (Table 5). This improvement was immediately followed by the treatment containing combination of RDF (100% as basal dose) + RDF (50% as top Dressing at 30 DAS) + FYM (7.5 t/ha) which showed 2006 kg/ha yield.

Table 1 Available nutrient in the soil of the study area soil at the initiation of trial.

Soil organic carbon (%)	0.87 (Walkely and Black (wet oxidation))
Av. N (kg/ha)	282 (0.32 % Alkaline KMnO ₄)
Av. P (kg/ha)	71.2 (0.5 M NaHCO ₃ (pH 8.5))
Av. K (kg/ha)	143 (Neutral N NH ₄ OAc)
Av. S (kg/ha)	12.64 (Turbidometric)

Table 2 Nutrient treatments provided to groundnut during cultivation.

S. No.	Treatments
1.	RDF (100% fertilizers as basal dose)
2.	RDF (100% fertilizers as basal dose) + FYM @ 7.5 t/ha
3.	RDF (75% as basal dose) + RDF (25%) as top Dressing at 30 DAS
4.	RDF (75% as basal dose) + RDF (25%) as top Dressing at 30 DAS + FYM @ 7.5 t/ha
5.	RDF (150% as basal dose)
6.	RDF (150% as basal dose) + FYM @ 7.5 t/ha
7.	RDF (100% as basal dose) + RDF (50%) as top Dressing at 30 DAS
8.	RDF (100% as basal dose) + RDF (50%) as top Dressing at 30 DAS + FYM @ 7.5 t/ha
9.	RDF (75% as basal dose) + RDF (75%) as top Dressing at 30 DAS
10.	RDF (75% as basal dose) + RDF (75%) as top Dressing at 30 DAS + FYM @ 7.5 t/ha

Here RDF: Recommended dose of fertilizer, FYM: Farmyard manure, DAS: Days after sowing

However, the treatment containing only RDF (100%) was not significantly different than the treatment having combination of RDF (75% as basal dose) + RDF (25% as top Dressing at 30 DAS + FYM (7.5 t/ha) but it is significantly lower than the combination of RDF (100%) + FYM (7.5t/ha). Rests of the treatments were at par with each other and there were no significant differences among these treatments with respect to pod yield. The minimum pod yield (1602 kg/ha) was noticed in the treatment containing RDF (75% as basal dose) + RDF (75% as top Dressing at 30 DAS) + FYM (7.5 t/ha).

Farmyard manure improved the physicochemical condition of the soil, provided favourable environment, stimulated the uptake of nutrients and increased the yield over the treatments where FYM was not added and the results are in confirmation to Mohapatra & Dixit, 2010. The results were in confirmation to results obtained by Rao & Shaktawat (2002).

The optimization of the mineral nutrition is the key to optimize the production of groundnut (Veeramani et al., 2012). The economic status of each treatment was determined by considering the cost of inputs used and gross returns (Table 4). In groundnut crop both pod yield and haulm yield have good market value. Highest gross monetary return (GMR Rs. 108450 ha⁻¹) was recorded by the treatment having RDF (100%) + FYM (7.5t/ha). Followed by the combination of RDF (100% as basal dose) + RDF (50% as top Dressing at 30 DAS) + FYM (7.5 t/ha) and RDF (100% as basal dose) with gross monetary return Rs. 100300 and Rs. 98300 respectively.

Here increase in net monetary return (NMR) is due to increase in GMR (Patil et al., 2003 & Dwivedi & Rawat, 2013). Benefit Cost ratio refers to monetary gain over each rupee of investment under the particular treatment.

The treatment containing combination of RDF (100% as basal dose) + FYM (7.5 t/ha) was recorded maximum profitability (5.45) and this was followed by the combination of RDF (150% as basal dose) ; RDF (75% as basal dose) + RDF (25% as top Dressing at 30 DAS) and RDF (100% as basal dose) + RDF (50% as top Dressing at 30 DAS) + FYM (7.5 t/ha) and these treatments were showing 4.91, 4.72 and 4.66 respectively. Thus it was revealed from the present investigation that integration of proper treatment combinations will definitely increase the pod yield (kg/ha) and profitability of groundnut crop with suitable nutrient management practices.

It can be concluded that adoption of a balanced nutrient management approach will safeguard the higher productivity and returns from money spent.

Conflict of interest

Authors would hereby like to declare that there is no conflict of interests that could possibly arise.

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Table 3 Pod yield of summer groundnut as influenced by different nutrient management practices.

Treatments	Pod Yield			
	2010	2011	2012	Pooled
RDF (100% as basal dose)	2178	1897	1825	1966
RDF (100% as basal dose) + FYM (7.5 t/ha)	2341	2070	2098	2169
RDF (75% as basal dose) + RDF (25% as top Dressing at 30 DAS)	1547	1736	1932	1738
RDF (75% as basal dose) + RDF (25% as top Dressing at 30 DAS) + FYM (7.5 t/ha)	2007	1802	1918	1909
RDF (150% as basal dose)	1931	1760	1774	1822
RDF (150% as basal dose) + FYM (7.5 t/ha)	2007	1657	1741	1801
RDF (100% as basal dose) + RDF (50% as top Dressing at 30 DAS)	2033	1588	1786	1802
RDF (100% as basal dose) + RDF (50% as top Dressing at 30 DAS) + FYM (7.5 t/ha)	2180	2013	1825	2006
RDF (75% as basal dose) + RDF (75% as top Dressing at 30 DAS)	1609	1601	1954	1721
RDF (75% as basal dose) + RDF (75% as top Dressing at 30 DAS) + FYM (7.5 t/ha)	1531	1458	1809	1602
SEm \pm	82	75	46	40
LSD (P=0.05)	238	218	133	114
CV%	8.45	8.54	4.92	-

Table 4 Economics as influenced by different nutrient management practices in summer groundnut .

Treatments	Pod yield (Kg/ha)	Cost of cultivation (Rs/ha)	Gross monetary return (Rs/ha)	Net return (Rs/ha)	BCR
RDF (100% as basal dose)	1966	20200	98300	78100	4.59
RDF (100% as basal dose) + FYM (7.5 t/ha)	2169	19900	108450	88550	5.45
RDF (75% as basal dose) + RDF (25% as top Dressing at 30 DAS)	1738	18400	86900	68500	4.72
RDF (75% as basal dose) + RDF (25% as top Dressing at 30 DAS) + FYM (7.5 t/ha)	1909	25540	95450	69910	3.74
RDF (150% as basal dose)	1822	18562	91100	72538	4.91
RDF (150% as basal dose) + FYM (7.5 t/ha)	1801	26662	90050	63388	3.38
RDF (100% as basal dose) + RDF (50% as top Dressing at 30 DAS)	1802	20362	90100	69738	4.42
RDF (100% as basal dose) + RDF (50% as top Dressing at 30 DAS) + FYM (7.5 t/ha)	2006	21502	100300	78798	4.66
RDF (75% as basal dose) + RDF (75% as top Dressing at 30 DAS)	1721	18802	86050	67248	4.58
RDF (75% as basal dose) + RDF (75% as top Dressing at 30 DAS) + FYM (7.5 t/ha)	1602	26902	80100	53198	2.98

Table 5 Yield components of summer groundnut as influenced by different nutrient management practices.

Treatments	Maturity duration	100 pod weight	100 Kernel weight	Shelling per cent
RDF (100% as basal dose)	114	76	41	64
RDF (100% as basal dose) + FYM (7.5 t/ha)	118	81	46	67
RDF (75% as basal dose) + RDF (25% as top Dressing at 30 DAS)	122	76	45	66
RDF (75% as basal dose) + RDF (25% as top Dressing at 30 DAS) + FYM (7.5 t/ha)	116	77	41	64
RDF (150% as basal dose)	117	75	44	64
RDF (150% as basal dose) + FYM (7.5 t/ha)	118	75	45	65
RDF (100% as basal dose) + RDF (50% as top Dressing at 30 DAS)	116	75	44	64
RDF (100% as basal dose) + RDF (50% as top Dressing at 30 DAS) + FYM (7.5 t/ha)	118	74	46	64
RDF (75% as basal dose) + RDF (75% as top Dressing at 30 DAS)	118	78	45	65
RDF (75% as basal dose) + RDF (75% as top Dressing at 30 DAS) + FYM (7.5 t/ha)	112	76	44	64
Mean	117	76	44	65
SEm +	1.5	1.1	1.4	1.8
LSD (P=0.05)	3.7	3.5	3.9	5.1
CV%	NS	NS	NS	NS