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Bhosale NA
Division of Agronomy, College of Agriculture, Kolhapur, MPKV, Rahuri, Ahmednagar, Maharashtra, India

Pisal AA
Extension Agronomist, Regional Extension Center, College of Agriculture, Kolhapur, MPKV, Rahuri, Ahmednagar, Maharashtra, India

Gawade NV
Department of Horticulture, College of Agriculture, PUNE, MPKV, Rahuri, Ahmednagar, Maharashtra, India

Correspondence
Bhosale NA
Division of Agronomy, College of Agriculture, Kolhapur, MPKV, Rahuri, Ahmednagar, Maharashtra, India

Yield performance of summer groundnut (*Arachis hypogaea* L.) as influenced by nutrient management

Bhosale NA, Pisal AA and Gawade NV

Abstract
A field experiment was conducted during the summer season of 2015 at College of Agriculture, Kolhapur, to study the yield performance of summer groundnut (*Arachis hypogaea* L.) as influenced by nutrient management. The experiment was laid out in randomized block design with 8 treatments and 3 replications. Increasing dose of fertilizers up to 125% recommended dose of fertilizers (RDF) significantly increased pod yield (35.42 q ha^{-1}) and haulm yield (29.15 q ha^{-1}). Oil yield was significantly higher in 125% RDF through inorganic fertilizer (T_1) (1237.79 kg ha^{-1}). Though the differences in shelling per cent and oil per cent among treatments were not significant, 125% RDF recorded numerically higher value (73.73 %, 47.82% respectively).

Keywords: Groundnut, Vermicompost, Nutrient management, Yield, Organic manure, Oil yield, Oil content

Introduction
Groundnut (*Arachis hypogaea* L.) is one of the important oilseed cash crop of the country. Groundnut alone contributes 70% of the total edible oil production. India is one of the major producer and rank second in groundnut production after China. It is a valuable cash crop planted by millions of small farmers because of its economic and nutritional value. Its kernels are rich source of edible oil (43.55%) and protein (25.28%). About two third of world production is crushed for oil and remaining one third is consumed as food. Groundnut cakes obtained after oil extraction is a high protein animal feed. In the sub-montane region, Plant Sugarcane-Ratoon- Sunflower is the traditional cropping system. However sunflower is exhaustive oilseed crop which results in depletion of soil fertility. Therefore, inclusion of legume oilseed like groundnut is necessary.
Fertilizers are the 'kingpin' in the present system of agriculture. Application of vermicompost as an organic source is an ideal for soil and crop management. Integrated nutrient management involves judicious use of organic and inorganic fertilizers to maintain soil fertility and productivity may ultimately cause a significant reduction in use of chemical fertilizer which is cost effective. The present study was undertaken to assess the effect of nutrient management on productivity of summer groundnut.

Material and methods
The experiment conducted during summer season of 2015 at the Post Graduate Research Farm, College of Agriculture, Kolhapur. The soil of the experimental plot was medium black (vertisols) with 90 cm depth, medium in available N (234.92 kg $ha^{-1)}$, P_2O_5 (21.42 kg ha^{-1}) and K_2O (275.47 kg ha^{-1}). The status of organic carbon content (0.42%) was low. The electrical conductivity and pH values were 0.12 dS m^{-1} and 7.2, respectively.
The experiment was laid out in a randomized block design with eight treatments *viz.*, T_1- 125% RDF through inorganic fertilizers, T_2- 100% RDF through inorganic fertilizers, T_3- 75% RDF through inorganic fertilizers + 25% N through vermicompost, T_4- 50% RDF through inorganic fertilizers + 50% N through vermicompost, T_5- 25% RDF through inorganic fertilizers + 75% N through vermicompost, T_6- 100% RDN through vermicompost,T_7 - 125% RDN through vermicompost and T_8- Absolute control. Each experimental unit was replicated thrice with the plot size of 4.50 x 3 m^2 and 3.50 x 2.40 m^2 as the gross and net plot, respectively.

N and P were applied in the form of urea and SSP. Vermicompost was applied 15 days before sowing in respective treatments. Regular biometric observations were recorded at specific time intervals by selecting randomly 5 plants in each treatment. Crop was harvested on 16.05.2015 and yield observations were recorded from net plots.

Results and discussion

The results presented in table 1 revealed that the oil yield was significantly higher in 125% RDF through inorganic fertilizer (T_1) (1237.79 kg ha^{-1}). The results confirm the findings of Kachot *et al.* (2001) [3].

While shelling per cent and oil content was not significantly influenced due to different integrated nutrient management treatments.

Application of 125% RDF recorded significantly highest oil yield (1237.79 kg ha^{-1}) and it was on par with 100% RDF through inorganic fertilizers. Probable reason for increase in oil yield is mainly due to cumulative effect of pod yield.

The mean shelling per cent was 69.83. Though the differences in shelling per cent among treatments were not significant, 125% RDF recorded numerically higher value (73.73 %). The results confirm the findings of Kachot *et al.* (2001) [3], Rajanikanth *et al*. (2008) [6] and Deshmukh *et al.* (2010) [1].

Though the differences in oil per cent among treatments were not significant, 125% RDF recorded numerically highest value (47.82 %). Oil content was not influenced significantly by different treatments, because oil biosynthesis is a complex process. Hence it is always difficult to modulate its content in plant through management practices.

Yield

The mean pod yield to the tune of 35.42 q ha^{-1} recorded with treatment of 125% RDF through inorganic fertilizer (T_1) was significantly superior over all the treatments except, T_2, T_3 and T_4. Minimum pod yield was recorded in absolute control (22.30 q ha^{-1}) (Table 2). Higher pod yield could be attributed to favourable changes in physical and chemical characteristics of the soil which might have enabled better pod formation. Moreover, the positive influence of these treatments through immediate supply of nutrients from inorganic sources especially at the early stage of the crop and slow and steady supply of nutrients from vermicompost throughout the crop growth period might have improved adequate biomass production and improvement in yield parameters resulting in higher pod yield. Similar result were reported by Kathmale *et al.* (2000) [4], Karunakaran *et al.* (2010) [5].

The significantly superior haulm yield (29.15 q ha^{-1}) was recorded with treatment of 125% RDF through inorganic fertilizer (T_1) however it was comparable with T_2, T_3 and T_4. Minimum haulm yield was recorded in control plot (16.12 q ha^{-1}) (Table 2).

Higher haulm yield could be attributed to easy availability of nitrogen and phosphorus which led to more meristematic activities of the plant leading to production of more number of leaves which ultimately increased haulm yield. Similar result were reported by Karunakaran *et al.* (2010) [5] and Gagare *et al.* (2011) [2].

Table 1: Effect of nutrient management on yield parameters of groundnut

Treatment	Oil per cent	Shelling Per cent	Oil yield (kg ha^{-1})
T_1 125% RDF through inorganic fertilizers.	47.82	73.73	1237.79
T_2 100% RDF through inorganic fertilizers.	47.71	73.17	1134.13
T_3 75% RDF through inorganic fertilizers + 25% N through vermicompost.	44.96	72.45	1061.44
T_4 50% RDF through inorganic fertilizers + 50% N through vermicompost.	45.09	70.24	1006.58
T_5 25% RDF through inorganic fertilizers + 75% N through vermicompost.	45.30	67.50	882.02
T_6 100% RDN through vermicompost.	45.58	68.52	817.47
T_7 125% RDN through vermicompost.	46.43	69.30	897.32
T_8 Absolute control.	43.50	63.64	619.00
S.E. ±	1.55	2.45	38.11
C.D.at 5%	NS	NS	115.59

RDN, Recommended dose of nitrogen

Table 2: Effect of nutrient management on yield of groundnut

Treatment	Pod yield (q) ha^{-1}	Haulm yield (q) ha^{-1}
T_1 125% RDF through inorganic fertilizers.	35.42	29.15
T_2 100% RDF through inorganic fertilizers.	33.01	27.46
T_3 75% RDF through inorganic fertilizers + 25% N through vermicompost.	32.06	26.59
T_4 50% RDF through inorganic fertilizers + 50% N through vermicompost.	31.87	26.59
T_5 25% RDF through inorganic fertilizers + 75% N through vermicompost.	28.37	23.21
T_6 100% RDN through vermicompost.	26.70	20.75
T_7 125% RDN through vermicompost.	27.98	21.47
T_8 Absolute control.	22.30	16.12
S.E. ±	1.76	1.41
C.D.at 5%	5.34	4.28

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