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Influence of phosphatic fertilizers, gypsum and sulphur on yield contributing characters and yield of groundnut (*Arachis hypogaea* L.)

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ABSTRACT

Field experiments were conducted at Agronomy farm, College of Agriculture, Pune during *Kharif* 2006 and 2007 to investigate the influence of phosphatic fertilizers, gypsum and sulphur on yield contributing characters and yield of groundnut. Trials were conducted in a Randomized Block with four replications and six treatments *viz,* Absolute Control (T_1) , Single super phosphate + 5 t FYM /ha (T_2) , Diammonium phosphate + 5 t FYM /ha (T_3) , Rock phosphate + 5 t FYM /ha (T_4) , RDF + Gypsum @ 500 kg /ha (250 kg gypsum /ha at the time of sowing and 250 kg gypsum /ha at the time of peg formation) + 5 t FYM /ha (T_5) and RDF + elemental sulphur @ 30kg /ha + 5 t FYM /ha (T_6). The results revealed that the yield contributing characters like number of developed pods/plant, pod weight/plant, hundred pod weight, hundred kernel weight, shelling per cent and dry pod and haulm yields were favourably influenced due to RDF + gypsum @ 500 kg/ha (250 kg gypsum/ha at the time of sowing and 250 kg gypsum /ha at the time of peg formation) + 5 t FYM/ha.

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Key words : Phosphatic fertilizers, Gypsum, Sulphur

INTRODUCTION

Groundnut is grown on a large scale in almost all the tropical and subtropical countries of the world. The most important groundnut growing countries are India, China, Nigeria, Sudan and U.S.A. It is grown over an area of 6.9 million hectares with total production of 5.3 million tonnes in whole world. India occupies the first place with regard to area and second in production. In India, during 2002-03 area and production of groundnut was 21.12 million ha and 11.31 million tonnes, respectively.

Its cultivation is mostly confined to the southern Indian states *viz*.,Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra. The other important states where it is grown are Madhya Pradesh, Rajasthan, Uttar Pradesh and Punjab.

In Maharashtra, groundnut is grown on an area of 519.5 thousand ha and the production of 545.2 thousand tonnes. Major groundnut growing districts in Maharashtra are Dhule, Nasik, Jalgaon, Ahmednagar, Parbhani, Pune, Satara and Kolhapur.

Groundnut kernels are rich in vitamins A, B_1, B_2 and E. Oil content in kernels is 43 to 49 per cent and protein content is 28 to 29.31 per cent. Groundnut cake is rich in protein content (46%) and is the best source of organic manure. The creepers are used as cattle feed and shells as fuel. Groundnut is not only used as edible oil but also used in manufacture of soap, hydrogenated vegetable oil, toilet requisites and used for culinary purpose as well. Therefore, groundnut crop plays an important role and has got immense importance in the national economy of our country. With increase in population in geometric progression, the demand for vegetable oil in India has been steadily increasing more than 4% per annum where the rate of increase in production is only 2% per annum. Every year the gap between demand and supply of edible oil is increasing.

Very meager information is available on calcium and sulphur requirement in groundnut hence, emphasis is given to nutrient management in groundnut.

MATERIALS AND METHODS

The experiments were conducted during *Kharif* 2006 and 2007 at Agronomy farm, College of Agriculture Pune 411 005 (M.S.) The soils of experimental area are grouped under inceptisol order. The soil of the experimental area is medium black with 60-90cm depth, dominant type of clay mineral having high swell- shrink properties.

The experiments were conducted in Randomized Block Design with four replications. Phule Pragati (JL-24) variety was used. There were six treatments consisting phosphatic fertilizers, gypsum and sulphur. The treatments consisting of Absolute control (T_1) , Single

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super phosphate + 5 t FYM/ha (T_2), Diammonium phosphate + 5 t FYM/ha(T_3), Rock phosphate + 5 t FYM /ha (T_4) , RDF + Gypsum @ 500 kg /ha (250 kg gypsum /ha at the time of sowing and 250 kg gypsum /ha at the time of peg formation) + 5 t FYM/ha(T_5) and RDF + elemental sulphur @ 30kg/ha + 5 t FYM/ha (T_6). The gross and net plot sizes were 4.00 x 3.00 and 3.060 x 2.40 m^2, respectively. The groundnut was dibbled at 30 x 10 cm^2.

RESULTS AND DISCUSSION

The results obtained from the present investigation are presented in Table 1.

Yield attributing characters

Mean number of undeveloped and developed pods per plant:

The effect of single superphosphate, diammonium phosphate, rock phosphate with 5 t FYM/ha , RDF + gypsum @ 500 kg/ha (250 kg gypsum/ha at the time of sowing and 250kg gypsum/ha at the time of peg formation) + 5 t FYM/ha and RDF + elemental sulphur @ 30 kg/ha + 5 t FYM/ha on number of undeveloped and developed pods/plant of groundnut at harvest is presented in Table1. The mean number of undeveloped pods was 2.53.

The groundnut nutrition with RDF + gypsum @ 500 kg/ha (250 kg gypsum/ha at the time of sowing and 250 kg gypsum /ha at the time of peg formation)+ 5 t FYM/ ha significantly recorded the least number (1.88) and developed pods (20.40) which was significantly superior over control (3.52) and rest of the treatments. An increased number of developed pods might be due to supply of calcium through gypsum which might have helped to develop the shell of pod. The remaining treatments were at par with each other for their developed pods at harvest. This might be due to the effect of calcium and sulphur which were present in SSP and gypsum and required for pod development and filling up of kernel of groundnut. These results are similar to those obtained by Devkumar *et al* (1998).

Mean weight of dry pods, 100 pods, 100 kernels and shelling percentage:

The mean weight of dry pods, weight of hundred pods, weight of hundred kernels and shelling percentage as influenced by the single super phosphate, diammonium phosphate, rock phosphate with 5 t FYM/ha, RDF + gypsum @ 500 kg/ha (250 kg gypsum/ha at the time of sowing and 250kg gypsum/ha at the time of peg formation) + 5 t FYM /ha and RDF + elemental sulphur @ 30 kg/ha

Table 1 : Mean number pods/plant(developed and undeveloped), dry pod weight, 100 pod weight, 100 kernel weight, shelling percentage and dry pod and dry haulm yields as influenced by different treatments (Pooled over two seasons)

Treatments	Number of pods/plant		Dry pod weight/ plant(g)	100 pod weight (g)	100 kernel weight (g)	Shelling (%)	Yield (q/ha)	
	Developed	Undeveloped					Dry pod	Dry haulm
Control	12.48	3.52	8.65	74.92	37.80	64.75	12.87	18.77
Single super phosphate + 5 t FYM/ha	16.21	2.39	16.09	97.65	43.15	67.80	19.38	28.15
Diammonium phosphate + 5 t FYM/ha	15.93	2.82	13.04	90.99	42.94	67.50	17.44	23.49
Rock phosphate + 5 t FYM/ha	14.67	2.55	12.61	85.35	42.30	67.00	16.69	23.15
RDF (25:50 NP kg/ha) + gypsum (500 kg/ha ½ at sowing and ½ at the time of peg formation) + 5 t FYM/ha	20.40	1.88	20.15	106.22	46.00	71.00	23.58	33.91
RDF + elemental sulphur 30kg/ha + 5 t FYM/ha	17.74	2.06	17.9	95.19	44.08	68.00	21.06	28.99
S.E.	0.58	0.31	0.44	3.17	1.43	0.73	1.14	1.45
C.D.(P 0.005)	1.76	0.93	1.33	9.57	4.32	2.23	3.44	4.37
General mean	16.13	2.53	14.74	91.72	41.54	66.66	18.50	26.36

+ 5 t FYM/ha are presented in Table 1.

The addition of RDF + gypsum @ 500 kg/ha (250 kg gypsum/ha at the time of sowing and 250 kg gypsum/ ha at the time of peg formation) + 5 t of FYM/ha significantly influenced the weight of dry pods/plant(20.15 g),weight of hundred pods (106.22 g) and shelling percentage(71 %),whereas, weight of hundred kernels were found at par with RDF + gypsum @ 500 kg/ha (250 kg gypsum/ha at the time of sowing and 250 kg gypsum/ ha at the time of peg formation) + 5 t FYM /ha (46.00 g) and the treatment of RDF+elemental sulphur @ 30 kg/ha +5t FYM /ha (44.08 g),single super phosphate (43.15 g),diammonium phosphate (42.94 g), rock phosphate(42.30 g) with 5 t FYM/ha,respectively. These results indicated that the phosphorus nutrition was necessary for increasing the hundred kernel weight of groundnut. However, the calcium, sulphur and phosphorus nutrition are required for the weight of dry pods, weight of hundred pods and shelling percentage. This might be associated with the calcium, nutrition through gypsum, single super phosphate and rock phosphate improves the pod formation thickness of shell and kernel formation. These results are similar to those obtained by Krishna *et al* (1997), Chaubey *et al.* (2000), Dutta *et al* (2004).

Mean dry pod and dry haulm yields:

Data pertaining to mean dry pod yield and dry haulm yield is presented in Table 1.The mean dry pod and dry haulm yields were 18.50q/ha and 26.36q/ha, respectively. The addition of RDF + gypsum @ 500 kg/ha (250 kg gypsum/ha at the time of sowing and 250kg gypsum/ha at the time of peg formation) + 5 t FYM/ha to groundnut was significantly superior in respect of dry pod and dry haulm yield (23.58 and 33.91q/ha).It was on par with RDF + elemental sulphur @ 30 kg/ha + 5 t FYM/ha for dry pod yield (21.06 q/ha).The dry pod yield was found at par with each other by an application of single super phosphate, diammonium phosphate and rock phosphate + 5 t FYM/ha (19.38,17.44 and16.69 q/ha, respectively. The control treatment has recorded significantly lower dry pod and haulm yield of groundnut(12.87, 18.77 q/ha respectively. Thus, an application of calcium, phosphorus and sulphur are essential for higher dry pod yield of groundnut. These results are similar to those obtained by Singh *et al.* (1990) and and Tripathi *et al.* (2003).

Conclusion:

The results revealed that the yield contributing characters like number of developed pods/plant, pod weight/plant, hundred pod weight, hundred kernel weight, shelling per cent and dry pod and haulm yield were favourably influenced due to RDF + + gypsum @ 500 kg /ha (250 kg gypsum/ha at the time of sowing and 250 kg gypsum /ha at the time of peg formation) + 5 t FYM /ha.

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