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EFFECT OF LEVELS AND METHODS OF GYPSUM APPLICATION ON GROWTH AND YIELD OF GROUNDNUT (*Arachis hypogea* L.)

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ABSTRACT

Field experiment conducted at Hebbal, Bangalore, on TMV 2 groundnut during 1977 and 1978 *Kharif* seasons to study the effect of levels and method of gypsum application indicated that the DMP plant^{-1}, pod yield and yield attributes increased appreciably. The increase in pod yield due to addition of different quantities of gypsum ranged from 209 to 465 kg.ha^{-1} over control. The corresponding increase in shelling percentage varied from 3.13 to 6.15 units and hundred kernel weight by 10.7 to 20.7 per cent. Among the various methods of gypsum application tested, application to the sides at flowering was the most effective where as broadcasting was the least effective in increasing the pod yield, shelling percentage and hundred kernal weight.

KEY WORDS: Groundnut, Gypsum, Methods of Application, Rates of Gypsum, Yield.

Groundnut is one of the important oil seed crops in India covering an area of 7.2 m.ha in the country with 0.73 m.ha in Karnataka State. In Karnataka, groundnut is usually grown on well drained, light to medium textured soils. These soils are generally low in soil fertility and organic matter and have low Ca saturation. The importance of Ca nutrition in the nutrition of groundnut has long been recognised. Several workers have reported profitable increases in groundnut yield from the use of lime or gypsum on soils with low exchangeable Ca content (Duggar and Funchess, 1911) and also emphasised the importance of proper placement of Ca for proper development of kernel and for increasing the groundnut yields. There is hardly and precise information available in the red soil region of Karnataka State regarding the relative influence of Ca for increasing the groundnut yields. To find out the optimum quantity and method of application of gypsum on growth and yield of groundnut crop, the present investigation was taken up.

MATERIALS AND METHODS

A field experiment was conducted during 1977 and 1978 *kharif* seasons, at Agronomy Field Unit, University of Agricultural Sciences, Bangalore, on red sandy loam soil. Bunch type (TMV 2) groundnut was grown under rainfed condition to study the Ca nutrition. Gypsum at the rate of 0.5 (G_1) 1.0 (G_2) and 1.5 (G_3) t.ha^{-1} (levels) was applied to the crop as broadcasting (M_1), application in the seed row at sowing (M_2), application to both sides of the row at sowing (M_3) and application to both sides of row at 35 to 40 days (M_4) (methods) respectively at all the three levels, besides dusting at 0.5 t ha^{-1} at 35 to 40 DAS (M_5) and control (M_6) (NPK only) was followed.

The fourteen treatments were replicated three times in a randomized complete block design. The crop was sown during August in both seasons with 25 cm x 15 cm spacing. The crop was fertilized with 25 kg N, 50 kg P_2O_5 and 25 kg.ha^{-1} K_2O and other cultivation practices followed as per the package of practices. The gypsum (60 mesh) obtained from the market was analysed for chemical purity before application to field. The required quantity of gypsum for each treatment was incorporated in soil at sowing and at flowering as per the treatment. Finer grade (200 mesh) was used for dusting the foliage.

RESULTS AND DISCUSSION

Data on total DMP plant^{-1} recorded on 60th day as influenced by levels and methods of application of gypsum during 1977 and 1978 are presented in Table 1. Significant increase in DMP (6.98 to 9.62 g) was recorded at all levels of gypsum application over control (4.90 g) during 1977. Similar effect of levels of gypsum on DMP of groundnut was also observed during second year of experimentation.

Method of application of gypsum produced profound influence on the DMP of groundnut during both the years. Highest DMP was recorded when the gypsum was added to the sides at flowering. The intraction effect of levels and methods of gypsum was significant during both the years. However, with application of 1.5 t.ha^{-1} gypsum to the sides at sowing produced higher DMP plant^{-1} as compared to broadcast method. Dusting produced DMP on a par with that obtained by 1.5 t of gypsum applied to soil by broadcasting and seed row.

Application of gypsum had favourable effect on pod yield of groundnut during both the years of experimentation (Table 1). With every increment in quantity of gypsum applied to soil the pod yield increased significantly. Highest pod yield of 1592 kg.ha^{-1} during 1977 and 1626 kg.ha^{-1} during 1978 were obtained with application of 1.5 t.ha^{-1} gypsum which worked out to 41.39 and 40.42 per cent increase over control.

Gypsum applied to soil produced similar effects on shelling percentage (Table 1). The average shelling percentage in control was around 60 which increased by about six units with addition of 1.5 ha^{-1}. Likewise, addition of 1.5 t.ha^{-1} gypsum also increased the hundred kernel weight by 30.3 per cent over control (Table 1). These results were in conformity with results of Sreedharan and George (1968) and Hartzog and Adams (1971), who have reported increased yield of groundnut with application of increasing level of either gypsum or lime as a source of Ca. The major beneficial effect of gypsum on groundnut was due to supply of Ca for good development of kernels and for increasing shelling percentage.

Method of gypsum application also had explicit influence on pod yield of groundnut during both the years. Highest pod yield was recorded when gypsum application was done to the sides at flowering and the per cent increase in yield over broadcasting, application in seed row and addition to sides at sowing was 10.51, 6.63 and 2.80 during 1977 and 17.40, 13.16 and 7.12 during 1978 season (Table 1). Similar trend was also noticed in shelling percentage but the differences were significant during 1978 only. Similar increase in pod yield due to Ca supplied to fruiting zone of groundnut were reported by Harris *et al.* (1956) and Patil (1975).

Pod yield obtained with dusting (200 mesh gypsum) 0.5 t.ha^{-1} gypsum was either on a par or superior to applying the same quantity of gypsum to soil by any of the four methods. When the level of gypsum applied to soil was increased to 1.0 and 1.5 ha^{-1} by broadcast or seed row methods, the pod yield did not increase significantly over dusting.

The present investigation revealed that application of gypsum increased the pod yield significantly at 1.5 t.ha^{-1}. The utility of method of application was more pronounced when the quantity of gypsum was low. Application of 0.5 t.ha^{-1} gypsum in the form of fine dust at flowering stage was found to be superior to soil application either by broadcast or in seed row.

Table 1. Influence of levels and methods of gypsum application on plant characters.

Treatment	Hundred kernel weight (g)			Pod yield kg.ha^{-1}			DMP at 60 DAS g plant^{-1}			shelling per cent		
	1977	1978	Mean	1977	1978	Mean	1977	1978	Mean	1977	1978	Mean
G_1	22.13	25.88	24.01	1428	1278	1353	6.98	5.55	6.27	63.60	63.65	63.63
G_2	23.01	26.90	24.96	1492	1402	1447	8.25	6.12	7.19	64.78	65.68	65.23
G_3	24.33	28.03	26.18	1592	1626	1609	9.62	6.81	8.22	65.59	67.70	66.65
SE	0.25	0.21	-	8	6	-	0.14	0.09	-	0.42	0.54	-
CD(5%)	0.73	0.61	-	27	20	-	0.41	0.24	-	1.23	1.53	-
M_1	22.64	26.36	24.50	1427	1333	1380	6.87	5.39	6.13	63.88	64.27	64.08
M_2	22.98	26.74	24.86	1479	1383	1431	7.28	5.69	6.49	64.19	65.40	64.80
M_3	23.12	26.88	25.00	1534	1461	1498	8.05	6.02	7.04	64.83	66.03	65.43
M_4	23.88	27.77	25.83	15.77	15.65	15.71	10.94	7.53	9.24	65.73	67.03	66.38
M_5	23.40	27.10	25.25	14.26	14.65	14.46	9.08	6.42	7.75	65.20	65.60	65.40
M_6	18.60	24.78	21.69	11.26	11.58	11.42	4.90	3.74	4.32	60.00	61.00	60.50
SE	0.29	0.25	-	10	8	-	0.16	0.10	-	0.49	0.62	-
CD 5%	0.84	0.70	-	31	23	-	0.77	0.28	-	NS	1.77	-
G_1M_1	21.43	25.48	23.46	1410	1230	1320	5.53	4.59	506	62.60	62.50	62.55
M_2	22.47	25.50	23.99	1400	1254	1327	5.29	5.12	5.56	63.60	63.20	63.40
M_3	22.10	25.63	23.87	1422	1290	1356	6.41	5.48	5.95	63.80	63.90	63.85
M_4	22.71	26.90	24.81	1480	1340	1410	9.99	7.01	8.50	6440	65.00	64.70
G_2M_1	22.50	26.90	24.55	1428	1320	1374	6.97	5.49	6.23	67.13	64.10	64.12
M_2	22.33	26.93	24.63	1454	1390	1422	7.62	5.68	6.65	64.50	66.50	65.50
M_3	23.10	27.00	25.05	1526	1430	1478	7.98	6.02	7.00	64.90	67.00	66.30
G_3M_1	24.00	27.00	25.50	1444	1450	1447	8.11	6.10	7.11	64.90	66.20	65.55
M_2	24.33	27.78	26.06	1582	1505	1544	8.23	6.28	7.26	64.46	67.50	65.98
M_3	24.16	28.00	26.08	1654	1664	1659	9.75	6.57	8.16	65.80	68.10	66.95
M_4	24.83	29.33	27.08	1690	1886	1788	12.39	8.28	10.34	67.20	69.10	68.15
SE	0.50	0.43	-	18	30	-	0.28	0.17	-	0.85	1.08	-
CD(5%)	1.47	1.22	-	53	85	-	0.82	0.49	-	2.46	3.07	

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NURSERY MANURING AND ITS EFFECT ON SEEDLING GROWTH AND YIELD OF RICE

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ABSTRACT

The effect of nursery manuring in rice was studied at Tamil Nadu Rice Research Institute, Aduthurai during 1985-1987. Two forms of fertilizers, diammonium phosphate (DAP) and urea plus super phosphate with different levels and time of application were compared. It was inferred that root and shoot length of rice seedlings were significantly influenced by the application of either DAP or urea plus super phosphate. Shoot length of seedlings was significantly increased by applying the fertilizer 10 days after sowing compared to basal application. Increased shoot length with lesser root length eased the pulling out operation with lesser per cent of seedling damage. Grain yield was not influenced by nursery manuring.

KEYWORDS : Rice varieties, Nursery manuring, Seedling growth yield.

In lowland transplanted rice, nursery management is very important for getting healthy and vigorous seedlings. Phosphorus application to rice nursery influenced rooting and promoted early root strike in the soil. But the crops which show visual phosphorus response in early stages do not give significant grain yield difference at harvest (De Datta *et al.* 1966). Basal application of DAP at 2 kg.40m^{-2} was being advocated for getting vigorous seedlings. However, this practice resulted in root snapping and difficulty in pulling out of seedlings in some pockets. In order to have a detailed investigation on nursery manuring and its effect on seedlings growth and grain yield of rice, an experiment was conducted.

MATERIALS AND METHODS

Field experiments were conducted at Tamil Nadu Rice Research Institute, Aduthurai during *Kuruvai* (1985, 1986) and *Thaladi* (1985-1986, 1986-1987) seasons. The soil of the experimental site was clayey loam with available