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YIELD AND QUALITY OF GROUNDNUT SEED AS INFLUENCE BY PHOSPHORUS, BIOFERTILIZER AND ORGANIC MANURES

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ABSTRACT

A field experiment was conducted during kharif season of 2000 and 2001 to study the effect of phosphorus, biofertilizers and organics on quality seed production of groundnut in mid altitude of Meghalaya. Application of 60 kg P2O5/ha significantly increased sed yield as well as quality parameters except shoot length. Seed inoculation with Rhizobium, PSM or both improved seed yields and quality. Application of organic also increased quality seed production, but highest seed yield and seed quality parameters were recorded with application FYM @ 5 t/ha in the presence of Rhizobium and phosphorus soliubilising microorganism followed by Neem cake @ 1.5t/ha with same biofertilizers.

INTERODUCTION

Groundnut is a recent introduction in north eastern region, the average being little over four thousand hectare with an annual production of about 3.6 thousand metric tones. The production potential of groundnut have shown that it can be successfully and profitably grown upto mid altitudes in the region if the quality seed is used on which the crop stand id depend. The groundnut is very exhaustive as compared to other legumes because it remove fairly large amount of nutrient from soil, even though it is considered to be the self-fertilizing crop. But for optimum growth and yield the crop requirement plant nutrient, especially phosphorus besides other nutrient, which can be managed through organic, inorganic and biofertilizer. Manuring not only improves the yield and deed quality of groundnut sustain soil health and productivity (Singh et.al., 1983). Phosphorus is required in the production of quality oilseeds but the efficiency of utilization of added phosphorus is r\very low (15-25 %) due to its fixation in soil as most of the north eastern soils region are acidic in nature. The phosphobacteria solubilise the fixed phosphorus and makes it available to plants while Rhizobium encourages the nodulation, thereby enhancing the nitrogen fixation. Hence the biofertilizer hold the key to the solution of current problem of fertilizer expensiveness and can be a part of integrated nutrient management. Keeping this in view, an experiment was conducted to study the effect of biofertilizers (Rhizobium and PSM), organic such as FYM and Neem cake and inorganic fertilizer on quality seed production in mid-altitudes of Meghalaya.

MATERIALS AND METHODS

The field experiment was conducted during kharif season of 2000 and 2001 at the research farm of ICAR Research Complex for NEH Region, Umiam, Meghalaya. The soil of experimental site was sandy loam having pH 4.6 organic carbon 1,53 %, low in available nitrogen (248kg/ha) and phosphorus (8.9kg./ha) and medium in available K2 O (250 kg/ha). The experiment was laid out in factorial randomized block design replicated trice with two phosphorus levels (0 and 60 kg P2O5/ha) and eight biofetilizer and organic viz. B1 - control, B2 - seed inoculation with Rhizobium B3 - seed inoculation with phosphorus solubilising microorganism (PSM), B4-B2 + B3 , B5 - Neem cake 3 t/ha, B6 -FYM 10 t/ha, B7 - Neemcake

1.5t/ha + B4 and B8 - FYM 5 t/ha + B4. Groundnut cultivars ICGS -76 was sown on 22 and 28 May,2000 and 2001 respectively, with a spacing of 30 x 10 cm. A starter dose of 20 kg N/ha through urea and 40 kg.K2 O/ha through muriate of potash as common dose and phosphorus through single super phosphate as well as organic manure were applied treatment wise at the time of sowing as basal. The seed was inoculated as per treatment with respective biofertilizer and sown next day in the field. all agronomic practices were followed as per the recommendation. After harvesting the pods were sun dried upto 7 % moisture levels and groundnut kernels were taken out of the pods and weighed. 100 seeds from each plots/treatment were taken and using whatmen No. 1 filter paper in the petery dishes at room temperature carried out germination test. After 14 days of germination 10 seedling from each treatments were selected randomly for recording their root and shoot length. From these two length total seedling length was calculated their root and vigour index was worked out by multiplying mean germination (%) to the seedling dry weight as suggested by Abdul Baki and Anderson (1973).

RESULTS AND DISCUSSION

Influence of phosphorus

Application of 60 kg P2O 5 /ha significantly increased seed yield of groundnut during both the year, which was 42.25 % (pooled) higher than control (Table 1). These results are in agreement with those of Pasricha et.al.(1987) who reported that 30-60 kg. P2O5 /ha . Favorable response of phosphorus application may be due to the fact that phosphorus encourages the root development, its proliferation and activities of Rhizobia, which intern increase N-fixation in the root nodules leading to improvement in growth and yield attributes (Singh et.al., 1983) resulting into significant improvement in yield.

Seed germination improved of the seed received from 60 kg P2O5/ha but the results were significant only during 2001 (Table 1) the root length of the seedling of the seed obtained from 60 kg. P2O5/ha was significant only during 2001, while shoot length was not significantly improved during both the years. However, seedling length was improved due to 60 kg P2O5 /ha application, which was 7.46 and 12.30 per cent higher over seedling length of the seed obtained from control during 2000 and 2001 respectively. The increase in seedling length due to phosphorus may be ascribed to the fact that phosphorus application resulted in assimilation of more food and manifestation I bold and healthier seed, which on germination might have helped in supporting the vigorous growth of seedling as is evident from the seed vigour index which was 8.99 and 16.23 per cent higher than the seed vigour of the seed obtained from control in the same order of years. These findings are in conformity with those of Nakagawqa et.al. (1990) who reported significant improvement in seed vigour due to phosphorus fertilization.

Influence of bio-organics

Seed inoculation either with Rhizobium or phosphorus solubilizing microorganism (PSM) alone, did not improve the seed yield but their combined effect significantly improved see yield only during 2000. the pooled analysis also showed similar results as obtained during 2000 recording 6.86, 8.80 and 21.45 per cent higher seed yield over PSM, Rhizobium and control respectively. The yield further icreased with the application of 10 t/ha FYM or 3 t/ha Neem cake during both the years (Table1) this may be ascribed to the released of nutrient ions with mineralization of organic manures thereby maintaining continuous availability of nutrient in the entire life cycle of the crop (Barar et.al., 1999). While seed inoculation with Rhizobium increase nitrogen fixation phosphorus by nodules and phosphate solubilising microorganism solubilise the fixed phosphate by secretion of organic acids and phosphate enzyme (Detroja et.al.,1997) resulting into maximum yield to the tune of 21.21 q/ha due to application of FYM@ 5 t/ha +

Rhizobium + PSM which was 12.34 and 65.45 percent higher per cent higher than the yield recorded with the alone application of 10 t FYM/ha and control, respectively. The yield recorded with Neemcake @ 1.5 t/ha +Rhizobium + PSM (22.03 q/ha) was also almost similar with the highest yield treatment.

Seed germination was significantly improved with the application of organic manures and fertilizer, alone or in combinations, recording maximum seed germination of the seed obtained with application of FYM 5 t/ha Rhizobium + PSM during 2000 and 2001. like wise maximum root and shoot length was recorded with the same treatment, leading to highest total seedling length of 10.32 and 9.75 cm with FYM 5t/ha + Rhizobium + PSM followed by 10.04 and 9.75 cm recorded with neem cake applied @ 1.5 t/ha in the presence of same biofertilizers. This is maybe due to production and translocation of photosynthesis to the seed which on germination showed maximum root, shoot and total seedling length leading to maximum value of seed vigour index (69.03 and 67.55) which was 56.60 and 73.16 per cent higher over control during 2000 and 2001, respectively. The seed vigour index recorded due to alone application of FYM or neem cake/biofertilizer was also significantly higher over control. From the present two year study, it is safe to deduce tht to obtained maximum quality seed yield of ICGS - 76 cultivar of groundnut, the seed should be inoculated with Rhizobium + PSM and applied with 5 t FYM/ha and given 60 kg. P2O5 /ha under mid hill agro climatic condition of Meghalaya.

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Table 1 Yield and quality of groundnut seed as influenced by phosphorus and bio-organics.

Treatment	Seed yield (q/ha)			Germination (%)		Root length (cm)		Shoot length		Seedling length(cm)		Seed vigour	
	Y_1	Y_2	Pooled	Y_1	Y_2	Y_1	Y_2	Y_1	Y_2	Y_1	Y_2	Y_1	Y_2
Phosphorus levels (kg/ha)													
P0	14.36	13.81	14.08	87.92	84.79	5.19	4.86	2.83	2.70	8.04	7.56	55.13	51.65
P60	19.54	20.51	20.03	83.87	88.33	5.45	5.46	3.19	3.01	8.65	8.49	60.09	60.03
CD(P=0.05	2.01	1.82	1.32	NS	3.12	NS	0.52	NS	NS	0.43	0.64	3.52	5.89
Bio-organics													
B1	13.02	12.61	12.82	82.50	80.83	3.43	3.06	2.08	1.54	5.52	4.61	44.08	39.01
B2	13.56	15.06	14.31	84.17	85.83	4.25	4.45	2.87	2.52	7.12	6.98	50.81	47.60
B3	15.29	13.84	14.57	85.83	84.17	4.72	5.03	2.91	2.62	7.63	7.65	50.01	46.21
B4	16.51	14.62	15.57	87.50	88.33	5.08	4.53	3.13	2.86	8.22	7.39	59.94	54.50
B5	18.58	18.93	18.75	89.17	86.67	5.38	5.57	3.34	3.11	8.72	8.74	61.63	60.31
B6	17.79	19.97	18.88	86.67	89.17	5.92	6.11	3.29	3.31	9.21	9.42	61.23	64.93
B7	20.68	20.01	20.35	90.00	88.33	6.84	6.31	3.16	3.40	10.04	9.72	64.16	66.60
B8	20.19	22.23	21.21	93.33	89.17	6.94	6.23	3.30	3.51	10.32	9.75	69.03	67.55
CD(P=0.05)	4.02	3.64	2.65	7.82	6.28	0.91	1.05	0.88	0.70	0.86	1.28	7.09	11.85