Indian J. Agron. **41** (1) : 172–174 (March 1996)

Response of groundnut (*Arachis hypogaea*) to farmyard manure, phosphorus and phosphate-solubilizing micro-organism

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Received: Mach 1993

A field experiment was conducted at Junagadh during the rainy season (*kharif*) of 1991. The soil was clayey in texture, medium in total nitrogen (0.054%), available phosphorus (30.8 kg/ha) and available potassium (156 kg/ha) and slightly alkaline in reaction (pH 7.9), with normal electrical conductivity (0.27 dS/m). The treatment consisting of 2 levels of farmyard manure (no FYM and 10 tonnes/ha FYM) as main plot and combinations of 3 levels each of phosphate-solubilizing micro-organism (control, *Pseudomonas striata* and *Paecilomyces jussisporus*) and phosphorus (control, 25 and 50 kg P_2O_5/ha) as subplot treatments were laid out in split-plot design with 4 replications.

Application of FYM significantly increased the number of nodules/plant and dry weight of nodules/plant (Table 1), but did not exert any significant effect on oil and protein contents in kernel. The treatment involving FYM @ 10 tonnes/ha proved significantly superior to the control, recording higher uptake of N, P and K. It appears that organic acids produced from organic substances may partly be responsible for quick release of nutrients which resulted into more uptake of nutrients. This finding supports the results of Sharma and Singh (1971). Manuring the crop with FYM resulted in significantly higher pod and haulm yields of groundnut than no FYM up to 12.58 and 14.74% respectively and resulted into higher net return.

Seed inoculation with *Pseudomonas striata or Paecilomyces fussisporus* resulted into significantly higher number of nodules/ plant, dry weight of nodules/plant, protein content in kernel and uptake of N, P and K by kernels and haulm of groudnut over no inoculation. As phosphate-solubilizing micro-organisms (PSM) have synergistic effect on the population of rhizobium in the soil which lead to increased nodulation. Seed inoculation with *Pseudomonas striata* performed better than that of *Paecilomyces fussisporus* for all these characters and resulted into higher pod and haulm yields of groundnut and resulted in higher pod and haulm yields of groundnut over no inoculation. This increased the availability of nutrients, release of growth-promoting substances and inhibition of pathogenic microorgnaisms. Similar observations were also reported by Seth (1991). The maximum net return of Rs 3,313/ha was noticed under seed inoculation with *Pseudomonas striata.* The increase in net realization under inoculation with *P. striata* and *P. fussisporus* were 41.58 and 20.85% respectively over the control (Table 1).

Fertilizing the crop with phosphorus (0 to 50 kg/ha) did not exert any significant effect on oil and protein contents in kernel, uptake

Table 1. Effect of different treatments on yield, nodulation, oil and protein contents, NPK uptake and economics in groundnut

Treatment	Pod yield (q/ha)	Haulm yield (q/ha)	Nodules/ plant	Nodule dry weight/ plant (g)	Oil content (%)	Protein content (%)	N uptake (kg/ha)		P uptake (kg/ha)		K uptake (kg/ha)		Net return (Rs/ha)
							Kernel	Haulm	Kernel	Haulm	Kernel	Haulm	
FYM (tonnes/ha)													
0	9.07	15.68	34.24	9.26	46.71	19.00	27.36	23.76	3.94	3.45	23.90	5.25	2,660
10	10.21	17.99	34.98	10.90	47.43	19.56	32.09	28.03	4.65	4.14	27.27	6.07	2,926
CD (P = 0.05)	0.36	1.29	0.10	0.56	NS	NS	4.05	1.63	NS	0.51	2.10	0.31	
PSM													
Control	9.13	15.72	33.56	9.49	47.04	18.75	27.46	24.06	3.76	3.27	23.67	5.27	2,240
Pseudomonas striata	10.03	17.62	35.44	10.50	47.23	19.87	31.67	26.98	4.71	4.07	26.36	5.96	3.313
Paecilomyces fussisporus	9.77	17.20	34.80	10.25	46.95	19.18	30.04	26.63	4.49	4.04	26.73	5.26	2,828
CD (P = 0.05)	0.24	0.68	0.25	0.42	NS	0.68	1.32	1.20	0.24	0.25	0.97	0.21	
P (kg/ha)													
Control	9.61	16.40	34.43	10.02	47.32	19.00	29.22	25.38	4.10	3.57	24.81	5.60	2,857
25	9.73	17.19	34.55	9.95	46.91	19.68	30.31	26.38	4.39	3.93	26.29	5.75	2,960
50	9.60	16.94	34.85	10.27	46.98	19.25	29.63	25.92	4.39	3.88	25.66	5.65	2,563
CD (P = 0.05)	NS	NS	0.25	0.42	NS	NS	NS	NS	0.24	0.25	0.97	5.65	

FYM, Farmyard manure; PSM, phosphate-solubilizing micro-organism

of N and K as well as yield of pod and haulm of groundnut (Table 1). A significant increase in number of nodules/plant, dry weight of nodules/plant and phosphorus uptake by pod and haulm was observed up to 25 kg P_2O_5/ha. Net return (Rs 2,960/ha) was also maximum under this treatment. The non-response of applied phosphorus might be due to the medium status of available P in soil prior to sowing of the crop.

REFERENCES

Seth, R.D. 1991. Integrated management of fertilizers in sugarcane. A paper presented at the Meeting of Gujarat State Fertilizer Co., Gandhinagar.

Sharma, J. P. and Singh, M. 1971. Effect of phosphorus bacteria culture on the efficiency of phosphatic fertilizers and on the yield of maize. *Indian Journal of Agronomy* **16**: 422–24.

Indian J. Agron. **41** (1) : 174–176 (March 1996)

Performance of drip and surface methods of irrigation for garlic (*Allium sativum*) under varying nitrogen levels

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Received: July 1993

A field experiment was conducted with garlic (*Allium sativum* L.) during the winter season of 1991–92 at Junagadh. The clayey soil had medium available nitrogen (289 kg/ha), low available phosphorus (7.53 kg/ha) and medium available potassium (200 kg/ha), with pH 8.1. Treatments consisted 5 levels of irrigation [surface method; and drip method at 0.4, 0.6, 0.8 and 1.0 cumulative pan evaporation (CPE)] as main plot and 3 levels of N (25, 50 and 75 kg/ha) as subplot in split-plot design with 4 replications. Irrigation water of 5 cm depth at 8–10-day intervals was applied for surface method, whereas for drip method it was applied on alternate days @ 40, 60, 80 and 100% replenishment of cumulative pan evaporation for 0.4, 0.6, 0.8 and 1.0 CPE respectively. The crop received half N and full P (22 kg/ha) and K (42 kg/ha) at the time of sowing, whereas the remaining N was top-dressed a month after sowing. The crop was sown on 30 October with 450 kg seed/ha and spaced 15 cm x 10 cm apart. The lateral pipe-lines for drip irrigation was spread in plot at 60 cm, whereas drippers fitted on lateral line at 45 cm apart.

The crop irrigated through drip-irrigation at 1.0 CPE recorded significantly higher bulb yield (75.87 q/ha) than surface method and all the remaining levels of drip irrigation (Table 1). The increase in bulb yield due to drip-irrigation method at 1.0 CPE was 8.35%, compared with surface