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GROUNDNUT CROP RESPONSE TO RHIZOBIUM INOCULATION

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A field trial was conducted during the summer season of 1980 to study the response of groundnut to *Rhizobium* seed inoculation. Data obtained on the experiment revealed that the nodulation and dry weight of plants were maximum at 120 days while that of nitrogen fixation were maximum at 60 days of plant growth. There were significant variations among the strains used in nodulation, nitrogen fixation and yield of groundnut All the strains except TAL 309 gave significantly higher yield over uninoculated control. Application of nitrogen without inoculation has reduced the number and dry weight of nodules compared to uninoculated control.

Legumes play an important role in the modern agriculture which have a vnique character of fixing atmospheric nitrogen in symbiosis with *Rhizobium*. It is well established fact that not all rhizobia present in the soil are effective. Hence it is important to introduce efficient strains of *Rhizobium* into the soil to exploit the symboiotic character in increasing the legume yield. Responses of *Rhizobium* to seed inoculation in legumes are reported by many workers (Oblisamy *et al*., 1976).

Among the legumes groundnut (*Arachis hypogea* L.) is an important oilseed legume grown in India and considerable work has been done on the response of this crop to *Rhizobium* seed inoculation. Several workers (Subramanian *et al*., 1976) have reported that there is good response of groundnut to *Rhizobium* seed inoculation while some other workers (Merwe *et al* , 1974) have reported that there is no response. To overcome this controversy and to select a suitable strain of *Rhizobium* a field experiment was conducted to study the effect of *Rhizobium* seed inoculation on the yield of groundnut with various strains of *Rhizobium* sp.

MATERIAL AND METHODS

A randomized replicated field trial was conducted in medium black soil during the summer season of 1980 under irrigated conditions.

Recommended doses of P & K at 30 and 10 Kg/ac respectively in the form of super phosphate and muriate of potash were applied to all the plots as basal dose.

Nitrogen at 10 Kg/ac in the form of ammonium sulphate was applied only to the plots which received as "nitrogen control". The polts which nave not received both *Rhizobium* as well as nitrogen served as "uninoculated control" plots. Four

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strains of *Rhizobium* sp. were used individually and in combination by preparing composite cultures (the individual strains were grown separately in the synthetic medium YEM for 6 days, then mixed in equal quantities before mixing with the carrier to get the composite cultures). The following seven strains were used as seven treatments in addition to an uninoculated control and a nitrogen control where in both the treatments there was no *Rhizobium* inoculation. i) A1 (local strain) ii) TAL 309 (Bangalore strain), iii) NC-92 (ICRISAT strain), iv) 5a/70 (ICRISAT strain), v) CPS-1 (A1 + TAL-309), vi) CPS-2 (A1 NC 92 + 5a/70), vii) CPS-3 (TAL-309+NC-92+5a/70).

Groundnut seeds Cv. DH 3-30 were inoculated with the *Rhizobium* culture and sown in the plots with a recommended spacing of 30 x 10cm. The crop was irrigated at an interval of 10 days. The observations on nodule number, dry weight of nodules, dry weight of plants and nitrogen content in plants were recorded at 60 days and in addition dry weight of pods per plant and total yield per plot were also recorded at 120 days. The nitrogen content in plant samples was estimated by microkjeldahl method.

RESULTS AND DISCUSSION

The results obtained on the effect of *Rhizobium* seed inoculation on the nodulation, nitrogen fixation and on the yield of groundnut are presented in Table-1. The results revealed that the nodule number in inoculated plots ranged from 88-142 per plant at 120 days of crop age as compared to 72 per plant at 120 days in uninoculated plots. The same trend was also observed in dry weight of nodules and dry weight of plants. There were significant differences in dry matter production at 120 days. Strains NC-92, A1 and CPS 1 recorded significantly higher dry matter production at 120 days over nitrogen control which was significantly superior over uninoculated control. Such an increased nodulation in groundnut at its advanced age was also observed by Patil (1977) in contrast to the results of Suraj Bhan (1975) who observed maximum nodulation between 60 and 90 days.

The range of nitrogen content at 120 days was 1.64 - 2.36 percent in inoculated plots as compared to 1.4 percent and 1.8 percent in uninoculated and nitrogen control plots respectively. Increases in the yields of groundnut due to *Rhizobium* seed inoculation obtained in this trial were in agreement with the reports Bajpai *et al.*, (1974). Though all the strains proved better than the uninoculated control, there were variations amongst the strains in their ability to nodulate and fix nitrogen. Amongst the seven strains used, strain NC-92 was found to be performing best and least performance was observed in strain TAL 309. These differences amongst the strains can be attributed to the variations in symbiotic efficiency of the strains (Singh *et al.*, 1976). It was also observed that the application of nitrogen without inoculation has reduced the

nodule number and nodule dry weight compared to the uninoculated control. From the results it can be concluded that the *Rhizobium* inoculation to groundnut with appropriate efficient strains can no doubt enhance the yield of groundnut.

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Table 1 Effect of seed treatment with *Rhizobium* strains on the nodulation, nitrogen fixation and on the yield of groundnut

Treatment	Nodules per plant at 120 Days	Dry weight of nodules per plant at 120 Days (mg)	Dry weight of plants at 120 Days (g)	Nitrogen content in plants 120 Days	Dry weight of pods per plant (g)	Pod yield per plot (kg)	Pod yield kg/ha
A1	136.00	148.00	16.10	2.18	8.14	5.20	2608
TAL-309	88.00	87.00	12.42	1.84	5.74	3.68	1840
NC-92	142.00	156.00	16.86	2.36	9.76	6.24	3124
5a/70	117.00	126.40	13.23	1.95	6.28	4.02	2014
CPS1(A1+TAL 309)	132.33	148.20	15.97	2.33	8.36	5.34	2676
CPS2(A1+NC-92+ 5a/70)	125.66	128.40	13.99	1.91	8.08	5.16	2584
CPS3(TAL—309+ NC—92+5a/70)	93.33	82.60	13.30	1.64	8.82	5.64	2826
Uninoculated control	72.00	62.60	9.12	1.40	5.00	3.32	1660
Nitrogen control	49.33	45.00	13.68	1.80	6.96	4.44	2226
C. D.	47.55	51.88	2.01	0.49	1.08	0.43	

Sig = Significant at 5 %