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RESEARCH ARTICLE

RESPONSE OF GROUNDNUT PLANT TO ARTIFICIAL INOCULATION

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ABSTRACT

Different methods of *Rhizobium* inoculation were attempted and it was found that *Rhizobium* applied in the form of water suspension just below the seed gave maximum nodulation followed by lime pellecting. Groundnut seed often possess a problem of seed inoculation because of delicate seed coat. Rhizobium inoculation has significantly influenced all the nitrogen fixing traits which ultimately contributed to the dry pod yield of groundnut. Beneficial effects of inoculation of plant growth and yield have been frequently observed in groundnut *Rhizobium* interation

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INTRODUCTION

Rhizobium belongs to the family Rhizobiaceae. It comprises of six species embraced within cross- inoculation groups on the basis of their nodulating ability of different plant species. Groundnut belongs to cowpea cross-inoculation group. It nodulates well in all kind of soils, indicating that the rhizobia which nodulate groundnut, are adequately present in soils of India. Rhizobia from different species of legumes are able to nodulate groundnut. In desert soil of Jodhpur where none of the Arachis species occur, groundnut nodulates very well (Gaur *et al*., 1974). This indicates that the groundnut is less specific in its *Rhizobium* requirement. However, the problem of nodulation in groundnut is by far the most complex one because of the fact that unspecific nodulation of groundnut by local strains is often not correlated with better nitrogen fixing abilities. The nodulation and nitrogen fixation by *Rhizobium* with inoculation is strongly influenced by various factors such as; genotypes, soil factors, method of inoculation, saprophytic abilities of the strains used for inoculation etc.

MATERIALS AND METHODS

The experiment was conducted in screen house using sterilized field soil in earthen pots of 22.5 cm x 30 cm size.

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Four treatments constituting three different methods inoculation and one un-inoculated control were replicated five times. Surface sterilized seeds of groundnut variety SB-XI were sown as per the treatments. Two plants per pot and five pots per treatment were maintained. The plants were observed for nodulation after 50 days. The treatments were as follows;

- *Rhizobium* inoculation with lime pelleting. Culture broth of *Rhizobium* was applied to the surface sterilized seeds and coated with lime to form the pellets.
- *Rhizobium* culture broth applied to the surface sterilized seeds without lime pellecting.
- *Rhizobium* culture broth applied while sowing just below the seed.
- No inoculation to the surface sterilized seed.

EXPERIMENTAL RESULTS

Four methods of inoculation were tried using the Rhs-I isolate, for comparing their effectiveness in the production of nodules in groundnut. The results recorded after 50 days are given in table 7. From the nodulation pattern, it is evident that maximum nodulation occurred when the *Rhizobium* culture broth was applied just below the seed, although in all other treatments nodulation occurred. Application of *Rhizobium* to seed, improved nodulation from 23.5 to 32.4 nodules per plant. When *Rhizobium* application was supplemented with lime pellecting, nodulation further improved to 42.3 nodules per plant. When *Rhizobium* culture applied just below the seed, nodulation further improved to (58.7) nodules per plant.

Table 1. Nodule production on groundnut per plant as influenced by the method of inoculation

Treatment	Average number of nodules per plant at 50 days
Rhizobium culture broth applied with lime pelleting to seed	42.3
Rhizobium culture broth applied without lime pelleting to seed	32.4
Rhizobium culture broth applied just below the seed	58.7
No application of *Rhizobium* (unsterilized soil)	23.5
SE +-	1.88
CD at 5 %	5.65

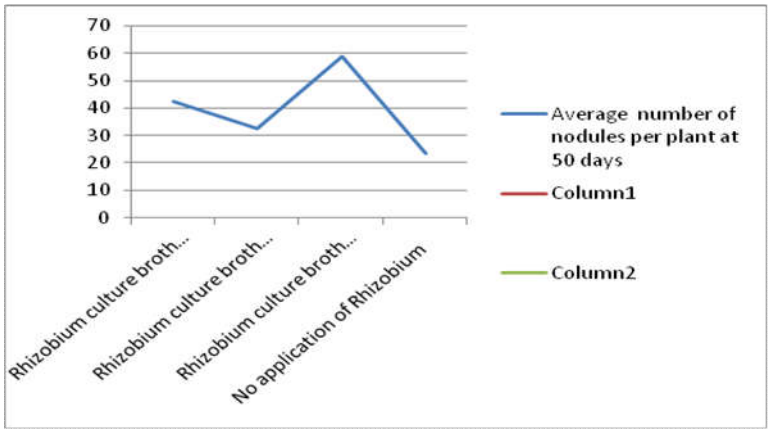

Fig.1. Graphical representation of average number of nodules per plant

Table 2. Effect of inoculation of two strains of Rhizobium number of nodules in two varieties of groundnut

Treatment	Nodule per plant at		
	30 days	40 days	50 days
Variety			
SB-XI	1.80	5.90	12.98
JL-24	1.85	6.18	13.30
SE +-	0.01	0.07	0.08
CD at 5 %	NS	NS	NS
Inoculation			
No inoculation	0.67	0.82	1.87
Inoculation of Rhs-1	2.84	8.38	18.22
Inoculation of Rhs-7	2.27	7.62	16.69
Inoculation of Rhs-8	1.98	7.04	15.75
SE +-	0.11	2.21	0.20
CD at 5%	0.33	6.61	0.58
Interaction (variety x strain)			
SE +-	1.20	0.36	0.41
CD at 5%	NS	NS	NS

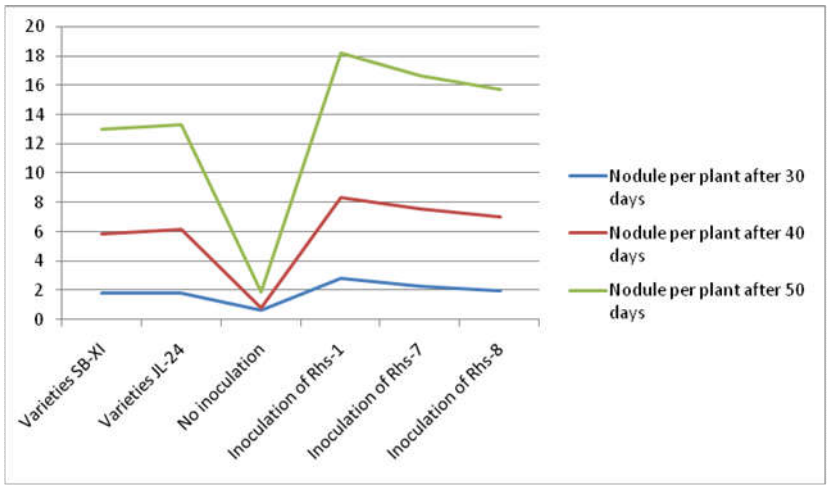

Fig. 2. Graphical representation of effect of inoculation of two strains of Rhizobium number of nodules in two varieties of groundnut

DISCUSSION

Different methods of *Rhizobium* inoculation were attempted and it was found that *Rhizobium* applied in the form of water suspension just below the seed gave maximum nodulation followed by lime pelleting. Groundnut seed often posses a problem of seed inoculation because of delicate seed coat. Several workers therefore attempted to improve up on the methods of inoculation. Liquid inoculation has been found to very effective in groundnut by Nambiar *et al*. (1981). *Rhizobiun* inoculations x host genotypes x added nitrogen interaction among with their individual effect were critical. Examined in pot culture experiment were these factors at two levels were considered in a factorial randomized block design.

Test revealed the following.

- Rhizobial inoculation improved the nitrogen fixation as indicated by different evaluation parameters of groundnut.
- Amongst the two varieties tested, the nitrogen fixation of JL-24 of superior order to SB-XI.
- Addition of fertilizer nitrogen did not influence the nitrogen fixing ability of the plants, however, it helped increasing the pod yield.
- The interaction between the *Rhizobium* inoculation and host variety were significant in respect of nitrogen content of the plant, but were not significant for yield.
- When *Rhizobium* inoculating were supplemented with fertilizer nitrogen, the nitrogen content of plant increased but not the pod yield.
- *Rhizobium* inoculation x host genotypes added nitrogen interaction by the large was absent indicating the *Rhizobium a*cted independent of other factors However, in case of nitrogen content of plant, occasionally positive interaction obtained, because of a high second order interaction with a genotype JL-24.
- Seasonal variations were evident as the response of varieties varied with the season.

Rhizobium inoculation has significantly influenced all the nitrogen fixing traits which ultimately contributed to the dry pod yield of groundnut. The varieties, SB-XI and JL-24, differed in their response to inoculation, JL-24 gave higher response to inoculation in terms of N- fixation and pod yield.

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