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**EFFECT OF GRADED DOSES OF NITROGEN ON THE GROWTH,
YIELD AND NITROGEN UPTAKE OF SOYABEAN UNDER
RHIZOBIUM INOCULATED AND NON-INOCULATED
CONDITIONS**

A pot experiment was conducted in the Division of Agronomy, Agricultural College, Vellayani in glazed porcelain pots of 20 cm diameter and 39 cm depth with 10 kg of representative surface red loam soil to evaluate the response of artificial inoculation with the appropriate rhizobial strain and to study the effect of application of combined nitrogen at varying levels on the performance of soyabean and its nitrogen uptake. Treatments consisted of 6 levels of nitrogen, viz. 0, 40, 80, 120, 160 and 200 ppm under inoculated and non-inoculated conditions, and were replicated thrice. Muriate of potash and superphosphate were applied to all pots to supply 200 ppm each of K_2O and P_2O_5 respectively. The whole amount of fertilisers were mixed with the soil before filling in. In the inoculated set, soaked soyabean seeds (variety K-16) were mixed with the inoculum just before sowing. One seedling each was retained in each pot. The plants were harvested at maturity and their height, number of pods per plant, dry weight of pods and stover, and nitrogen uptake by pods and stover were recorded,

Data on plant height at harvest, number and weight of pods, weight of stover, total dry weight and nitrogen uptake are presented in Table 1. Excepting in plant height there was no significant effect of levels of nitrogen on any of the plant characters or on nitrogen uptake. Application of nitrogen even as high as 200 ppm failed to modify any of the plant characters or bring about any increase in nitrogen uptake as compared to control. This points to the fact that nitrogen made available to the plants by the agency of symbiotic nitrogen fixation could take care of the nitrogen needs of soyabean plant and in this respect, combined nitrogen supply even at the highest dose tried could be of no additional advantage. Weber (1966) and Tanner and Anderson (1964) observed that presence of nitrogen in the nitrate and ammoniacal forms in the nutrient medium hinders the symbiotic fixation of nitrogen and in all probability, it is the balancing effect of symbiotic fixation and ionic retardation of symbiosis that nullified the expression of the effect of applied nitrogen. It may be noted that though the effect was not significant, the highest mean figures in terms of number of pods per plant, stover weight, total dry weight, nitrogen uptake by pods and stover, and total nitrogen uptake were recorded at 40 ppm of

Table 1

Effect of levels of nitrogen and inoculation on plant height at harvest weight of stover total dry weight and nitrogen uptake

Treatments	Plant height cm.	No. of pods/plant	Weight of pods (g)	Weight of stover/plant (g)	Total dry Weight (g)	N uptake (g/plant)		
						Pods	Stover	Total
<i>Levels of N (ppm)</i>								
0	55.7	87.0	26.3	11.8	38.1	1.73	0.19	1.92
40	62.2	112.5	26.0	20.1	46.1	1.74	0.28	2.02
80	59.2	72.3	22.6	12.9	35.5	1.46	0.22	1.67
120	65.5	87.3	18.1	16.2	34.2	1.17	0.22	1.39
160	67.0	66.8	19.2	14.9	34.0	1.25	0.30	1.55
201	69.3	81.8	19.1	14.0	33.1	1.25	0.29	1.54
F. test	Sig.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
S. Em \pm	5.1	15.9	3.6	2.9	4.8	0.25	0.05	0.24
C. D.	14.9	..	..	..	..	..	..	..
<i>Inoculation</i>								
Inoculated	62.7	101.4	22.7	15.6	38.2	1.49	0.27	1.76
Non-inoculated	63.6	75.7	21.1	14.4	35.5	1.37	0.23	1.60
F test	N.S.	Sig.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
S. Em \pm	0.7	9.8	1.1	0.5	2.0	0.08	0.03	0.11
C. D.	..	28.4	..	..	..	..	..	..

applied nitrogen. The mean figures noted at higher levels of nitrogen and in control were lower. This may point to the fact that fertiliser application at the lowest dose had some beneficial effect on the crop. This level of nitrogen, could probably, supply a starter dose which could favourably improve root establishment without seriously impairing the subsequent symbiotic fixation of nitrogen.

Excepting in the case of number of pods per plant, inoculation was not found to have significant effect on any of the plant characters and on nitrogen uptake, though higher mean values of all the observed plant characters and nitrogen uptake were noted in the inoculated series. Inoculation was thus of some advantage probably by the presence of suitable bacterial strains in adequate numbers. This initial advantage due to the inoculation was probably offset by the

multiplication of the native microbial strains and consequent symbiotic nitrogen fixation. The statistical parity between the inoculated and non-inoculated series points to either occurrence of effective strains of *Rhizobium japonicum* in the soil or to equality in efficiency of already existing microbial population with introduced species.

സംഗ്രഹം

സൊയാബീൻ വിത്തുകളിൽ റൈസോബിയം ബാക്ടീരിയ നിവേശനം ചെയ്യപ്പെട്ടും ചെയ്യപ്പെടാതെയും വിതച്ചു ഒരു ദശലക്ഷത്തിൽ 0, 40, 80, 120, 160, 200 ഭാഗം എന്ന തോതുകളിൽ നൈട്രജൻ നൽകി നടത്തിയ ഒരു പരീക്ഷണത്തിൽ, ചെടിയുടെ ഉയരം ഒഴികെ യുള്ള മറ്റു സ്വഭാവങ്ങളിൽ നൈട്രജന്റെ തോതിലുള്ള വ്യത്യാസം കാരണം സാരമായ യാതൊരു വ്യത്യാസവും ഉണ്ടായില്ല. എന്നാൽ, കായ്കളുടെ എണ്ണം, വൈജ്യോൽ രൂക്ഷം, ആകെയുള്ള ശുഷ്കരൂക്ഷം, നൈട്രജൻ വലിച്ചെടുക്കൽ എന്നീ സ്വഭാവങ്ങളിൽ ദശലക്ഷത്തിന് 40 ഭാഗം നൈട്രജൻ എന്നതോതായിരുന്നു അല്പമെങ്കിലും അനുക്രമമായി കണ്ടതു്. അതുപോലെതന്നെ, കായ്കളുടെ എണ്ണമൊഴികെ മറ്റു സ്വഭാവങ്ങളിൽ ഒന്നിനും ബാക്ടീരിയ നിവേശനംകൊണ്ടു് സാരമായ ഫലങ്ങളൊന്നുമുണ്ടായതായും കണ്ടില്ല.

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