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EFEECT OF NITROGEN FERTILIZER ON NODULE PRODUCTION IN CHICKPEA (*CICER ARIETINUM* L.) INOCULATED WITH DIFFERENT STRAINS OF *RHIZOBIUM*

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The effect of different doses of nitrogen fertilizer on the nodule production in chickpea in association with different strains of *Cicer Rhizobium* were studied. It was observed that the degree of inhibition of rhizobial multiplication in the rhizosphere and nodulation depends upon the concentration of nitrogeneous fertilizers to the leguminous plants. Application of inorganic nitrogeneous fertilizer responded upto certain level above which the symbiotic activities declined.

INTRODUCTION

Application of organic manures as a source of nitrogen promote the rhizobial multiplicatlon as well as nodulation and nitrogen fixation in rhizosphere soil (Walker and Brown, 1935 ; Boonier, 1957). Poi and Kabi (1979) reported that the yield of forage legume, namely Barseem (*Trifolium alexandrinum* L.) might be higher by inoculation with appropriate rhizobial strains than the application of cowdung or inorganic nitrogenous fertilizers. When inorganic nitrogenous fertilizers were applied to nodulated plants the symbiotic nitrogen fixation would be reduced for readily availabiliy of nitrogen from the supplied nitrogenous fertilizer (Allos and Bartholomew, 1959). Pate and Dart (1961) and Stewart (1966) reported that with the application of nitrogenous fertilizers in low level there would be increased growth of the nodules causing more nitrogen fixation to the nodulated plants. It was observed (Poi, 1985) that the rhizobial inoculation together with inorganic nitrogen application also responded upto certain level above which the symbiotic activities declined. The effect of system of production inoculation and fertilizer on plant and nodule development were assessed by Kharifa (1987) and was found that nodulated plants could fix more

than 80 kg N ha under irrigation whereas under rainfed conditions nodulation was ineffective. Under both systems of production N gave significant increments in grain yields. Nonnodulating plants with applied nitrogen produced more total dry matter than nodulated plants during the vegetative phase.

In view of the above facts an experiment wes conducted to find out the effect of nitrogen applied *in vivo* in different doses through urea fertilizer on *Cicer-Rhizobium* nodulation system.

MATERIALS AND METHODS

Five doses of nitrogen kg N/ha such as 15, 30, 45, 60 and 75 were applied through urea *in-vivo* on different strains of *Cicer-Rhizobium* namely, B-1/3, B-28/7, B-66/5, B-38/5 and B-50/2. The seeds of chickpea (*Cicer arietinum* L.) variety B-108 were sown in 10 cm diameter earthen pots containing sterilized soil. Different doses of nitrogen was applied as solution with sterilized tap water at the rate of 5 ml per pot just after emergence of seedlings, simultaneously five days old broth culture (incubated at ±28°C) of different strains of *Cicer-Rhizobium* were applied in equal amount to each of the same pots. Control sets were maintained for each strain by inoculating *Rhizobium* only to same host. Whole set was replicated thrice. The pots were kept in green house. Observations were made at the initiation of flowering stage of the plant. The plants were uprooted carefully and washed thoroughly with tap water for recording the data.

RESULTS AND DISCUSSION

Data presented in Table 1 showed that all the strains are more or less affected to the number of nodule per plant by the application of nitrogen in the form of urea irrespective of all doses in comparison with control. In higher doses of nitrogen such as 60 kg of N/ha and 75 kg of N/ha were severely affected to reduce the number of nodule per plant varrying from 7.33 to nil. Higher number of nodules

Table 1. *Effect of different doses of nitrogen on nodulation of chickpea* (Cicer arietinum) *inoculated with different strains of* Rhizobium

Doses of nitrogen (Kg N/ha)	Average number of nodule per plant (*Average of three replication) Strains				
	B-1/3	B-28/7	B-66/6	B-38/5	B-50/2
Control	34.33	40.66	34.66	58.00	55.66
15	33.66	16.66	28.00	18.33	31.00
30	30.33	14.00	30.33	5.00	8.00
45	9.33	15.33	13.33	7.33	5.33
60	Nil	7.33	Nil	6.66	Nil
75	Nil	Nil	Nil	3.00	Nil

*Each replication contains five plants

33.66 and 31.00 were obtained in the strain numbers, B-1/3 and B-50/2 respectively when the lowest dose of nitrogen i.e. 15 kg of N_2/ha was applied to the host. The highest dose 75 kg of N_2/ha, was applied it was found that no strains of *Rhizobium* could survive except strain number B-38/5 on which only three number of nodules were counted. It would appear that nodular number per plant decreased even to nil also with the increasing doses of nitrogen when applied on the strains of *Cicer-Rhizobium* tried in this experiment.

These observations are mostly corroborative with the findings of Walker and Brown (1935), Bonnier (1957), Allos and Bartholomew (1959), Pate and Dart (1961) and Poi (1985). The rate of inhibition of rhizobial multiplication in the rhizosphere as well as nodulation depends upon the concentrations of nitrogenous fertilizers applied to the leguminous crops.

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