

Research Paper :

## Bio assay of different native isolates of *Azospirillum*

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### ABSTRACT

An experiment was conducted at ARS, Amaravathi to isolate the native strains of *Azospirillum* from the rhizosphere of chillies and to study their efficiency on growth, nutrient content, uptake, nitrogen forms and microbial population in soil. Chilli seedlings were grown for 45 days in the pots and were then removed carefully along with roots. Dry weights of plant samples were recorded and were analyzed for nitrogen, phosphorus and potassium concentrations and N,P and K uptake in the seedlings were computed. Rhizosphere samples were analyzed for nitrogen forms and microbial population. Inoculation with different native isolates of *Azospirillum* significantly increased nutrient uptake by the chilli seedlings and also nitrogen content in soil. Among the different native isolates tested, SCH<sub>18</sub> was superior to all other native isolates and was at par with the standard strain ICM 1001.

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Use of bio fertilizers to supplement the nutrient requirement of commercial crop like chilli is recently adopted by the farmers. Bio-sources of nutrients like organic manures, composts, biofertilisers can reduce the dependence on chemical fertilizers and help in reducing the heavy consumption of artificial fertilizers. Reduction of fertilizer N by 25-50% to this crop can be achieved by better utilization of associative N<sub>2</sub> fixing diazotrophism. Apart from fixing N<sub>2</sub>, diazotrophs can effect plant growth by the synthesis of phyto hormones and vitamins, improved nutrient uptake and solubilization of inorganic phosphate. Multiple mechanisms operate simultaneously and result in the *Azospirillum*-plant responses. The sum of these activities when induced under appropriate environmental conditions, results in the enhanced plant growth and yield (Bashan and Levanony,1990).The native isolates of *Azospirillum* were known to establish well and multiply fast due to familiarity with the native environment when compared to the exotic strains.

### MATERIALS AND METHODS

A field experiment was conducted at Agricultural Research Station, Amaravathi to isolate the native strains of *Azospirillum* from the rhizosphere of chillies and study their efficiency on growth, nutrient content and uptake in chilli seedlings and nitrogen forms and microbial population in soil. Bulk soil collected from the field having sandy clay loam texture was shade dried, pounded with wooden hammer and then processed through a 2 mm sieve. The soil was then filled into plastic pots @ 10 kg per pot. Thirty native isolates and one standard strain of

*Azospirillum* besides control were taken as treatments and replicated thrice in a Completely Randomized Design.

Two seeds of chilli variety LCA 334 were sown in each pot. After two weeks, one seedling was removed and only one was maintained in each pot. All the thirty native isolates and one standard strain (ICM 1001) of *Azospirillum* grown in nitrogen free malate broth and log phase culture (48 hours) were applied @ 5mL pot<sup>-1</sup> near the root zone and then covered with soil.

Chilli seedlings were grown for 45 days in the pots and were then removed carefully along with roots. Fresh weight of the seedlings was recorded, sun dried for 3 days and oven dried at 60<sup>o</sup> C. Dry weights of plant samples were recorded and were analyzed for nitrogen, phosphorus and potassium concentrations and N and P uptake were computed. Rhizosphere samples were analyzed for nitrogen forms and microbial population.

### RESULTS AND DISCUSSION

The nitrogen content in the shoot of chilli seedlings at 45 DAS ranged from 1.21 to 1.59 per cent with a mean of 1.43 per cent. All the *Azospirillum* isolates were found to be superior to control. The P content in the shoot of chilli seedlings at 45 DAS ranged from 0.10 to 0.13 per cent with a mean of 0.12 per cent. All the isolates could increase the shoot P content over un-inoculated control. Concentration of K in chilli seedlings at 45 DAS ranged from 0.94 to 1.26 per cent was recorded when inoculated with standard strain followed by SCH<sub>18</sub> (1.243%).

Uptake of nitrogen in chilli seedlings ranged from 168.9 to 242.9 mg pot<sup>-1</sup>. The highest uptake of 242.9 mg