# NITROGEN FIXATION BY AZOTOBACTER IN A SANDY CLAY LOAM SOIL

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## ABSTRACT

A pot experiment was conducted to study nitrogen fixation by Azotobacter in soil supplemented with 1% glucose. Soil was kept at field capacity moisture level (16%) and inoculated with Azotobacter strains (A1, A2, A3, A4, A5 and A6) at room temperature for 150 days. All the strains increased the nitrogen content of soil significantly as compared to control. Linear increase in soil nitrogen content was observed upto 90 days incubation and after that a slight decrease was noted. Strain A4 showed the higher activities and fixed 144 Kg N $ha^{-1}$ which was 12.03% higher than control (after 90 days incubation).

Key words: Nitrogen fixation, Azotobacter, Inoculation, Incubation.

## INTRODUCTION

It was in 1885 when Berthelot demonstrated that fallow soil on incubation gained nitrogen due to the action of living agents. The next great step was taken around the turn of the century when Beijerinck (1901) discovered aerobic nitrogen fixing bacteria to which he gave the generic name Azotobacter. Azotobacter incubation significantly increased soil nitrogen content (Asuncion, et al., 1983). Azotobacter in vitro under favourable conditions fixed usually upto 20 mg N $g^{-1}$ of carbon source consumed (Kasirajan et al., 1976; Abd-el-Malik et al., 1979). *A. chroococcum* and *A. vinelandii* fixed 18.25 and 16.75 mg N/100 ml of broth, respectively (Wani, et al., 1983). Under field conditions, Azotobacter

### Isolation of Azotobacter

For the isolation of Azotobacter, composite soil samples were collected (having 106 Azotobacter cells $g^{-1}$ soil) from the experimental area of the University of Agriculture, Faisalabad. Modified manitol agar medium used for the isolation of Azotobacter had the following composition:

**Composition of modified manitol agar medium (Society of America Bacteriologists, 1957)**

| | |
|---|---|
| Mannitol | 2.0% |
| K2HPO4 | 0.1% |
| MgSO4.7H2O | 0.02% |
| NaCl | 0.02% |
| FeSO4.7H2O | Traces |
| NaMOO4.2H2O | Traces |
| CaCO3 | 0.5% |
| Difco Bacto agar | 1.5% |
| pH | 8.0 |

One ml soil suspension of various dilutions (10:1, 100:1 and 1000:1) from each sample was added under sterlized conditions into sterlized petridishes (9cm dia) containing modified mannitol agar medium sufficient to cover the entire petridish. The media were thoroughly