

Charin Phookkasem 2011: Effects of Azospirillum on Nitrogen Fixation and Growth Enhancement of Maize. Master of Science (Soil Science), Major Field: Soil Science, Department of Soil Science. Thesis Advisor: Associate Professor Thongchai Mala, Ph.D. 97 pages.

This study aimed to determine the efficiency of various azospirillum isolates on nitrogen fixation, auxin production and phosphate solubilization. The experiment was divided into 2 experiments. 1) The efficiency of various azospirillum isolates on nitrogen fixation, auxin production and phosphate solubilization was determined. The experiment was laid out in completely randomized design consisting of 16 treatments (15 isolates of azospirillum and a control) with 4 replications. The efficiencies of nitrogen fixation (at 3 and 7 days after incubation) and auxin production (at 1, 2 and 3 days after incubation) were determined in N free Bromthymol blue medium, but that of phosphate solubilization (every 8 hours) was evaluated in Pikovskaya's broth. The result revealed that the ability of various isolates on nitrogen fixation, nitrogenase activity, auxin production and phosphate solubilization were significant, statistically. The two isolates (LB₃ and LB₁₀) expressed outstanding the nitrogen fixation as much as 1.84 mg N/L at 3 day after incubation. Later, at 7 day after incubation, the LB₅ and LB₁₀ showed the highest nitrogen fixation as much as 2.64 mg N/l. The nitrogenase activity of LB₁₀ at 7 day after incubation was the highest (100.24 $\mu\text{mol C}_2\text{H}_4/100 \text{ ml/hr}$). The auxin production of S₂₃ was pronounced at 53.74, 31.85 and 22.57 $\mu\text{g/ml}$ at the first, second and third days after incubation, respectively. The abilities of various azospirillum isolates on phosphate solubilization were significant. The 5 isolates that showed higher phosphate solubilizing abilities were LB₇, LB₉, S₄₂, LB₆ and LB₈. 2) Effect of azospirillum in promoting the growth of maize. The 2 \times 5 \times 4 factorial in CRD was carried out with 4 replications. The first factor was soil preparation (sterile and non sterile soil), the second factor was various azospirillum isolates (LB₅, LB₈, LB₉, LB₁₀ and control) and the last factor was rates of nitrogen fertilizer (0, 5, 10 and 20 kg N/rai). The results demonstrated that soil preparation, azospirillum isolates and rates of nitrogen fertilizer affected the height of maize at 4 and 6 weeks. Inoculation of LB₅ and LB₁₀ with 5 kg.N/rai tended to give higher plant than other rates. Inoculation of azospirillum affected the nitrogenase activity both from soil and within root. The maximum nitrogenase activity (0.62 $\mu\text{mol C}_2\text{H}_4/100 \text{ g root/hr}$) was found in non sterilized soil +LB₉+5 kg N/rai. Inoculation of azospirillum gave higher N content than that of non inoculation. Sole azospirillum application gave N to the plant as much as that from 10 kgN/rai.

Student's signature

Thesis Advisor's signature