

ABSTRACT

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EFFECT OF ASSOCIATIVE NITROGEN FIXING BACTERIA INOCULATION ON THE GROWTH OF VETIVER GRASS

BY

PRATEEP AIBCHAROEN

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Chairman : Dr. Settha Siripin

Department/Faculty : Agronomy, Faculty of Agricultural Production

The study on the effect of associative nitrogen fixing bacteria inoculation on the growth of vetiver grass had four objectives: (1) to screen and classify the free living and associative nitrogen fixing bacteria which were from roots of vetiver grass in areas around Chiangmai and Chiangrai provinces; (2) to study the nitrogen fixing activity potential of bacteria; (3) to study the effect of nitrogen fixing bacteria inoculation on the growth and nitrogen fixing activity of vetiver grass in different conditions; and (4) to determine the effect of nitrogen fertilizer application in different concentration levels and nitrogen fixing bacteria inoculation on the growth and nitrogen fixing activity of vetiver grass.

The results of Experiment I showed that 17 isolates of associative nitrogen fixing bacteria were screened from the roots of vetiver grass in Chiangmai and Chiangrai provinces. These included five isolates collected from Huaylarn (HL), Sankampang district (Chiangmai); four isolates collected from Land Development Station (LDS), Maung district (Chiangrai); four isolates collected from Ban Meakaotomloun (CR), Maung district (Chiangrai); two isolates collected from Ban Pongpufuung (CR), Maesuy district (Chiangrai); and two isolates collected from Ban Teendoi (CR), Maesuy district

(Chiangrai). All isolates were classified using the Bergey 's Manual of Determinative Bacteriology. The nitrogen fixing bacteria were classified into three groups namely: Group I, using glucose as carbon source and showing similarity to *Azotobacteraceae*: Group II, using sucrose as carbon source and showing similarity to *Enterobacteriaceae*: and Group III, using malic acid as carbon source and showing similarity to *Spirillaceae*. All isolates were found to have difference in nitrogen fixing activity potential. The highest nitrogen fixing ability was shown by CR 10 isolate at 469.51 nmol C₂H₄/sample/day. Most isolates were also found to have difference in the physiology and morphology of their colonies and cells.

The results of Experiment II showed that nitrogen fixing bacteria inoculation increased the growth of vetiver grass and total biomass i.e. root and leaf dry weight. The potential of nitrogen fixing ability was also better than the uninoculated vetiver grass. All isolates of bacteria were nitrogen source for growth of vetiver grass.

The results of Experiment III revealed that inoculated vetiver grass showed better growth, biomass and potential of nitrogen fixing ability than the uninoculated vetiver grass. Nitrogen fertilizer application, in the form of ammonium-sulfate at different rates 0, 10, 20, and 30 ppm, showed that 20 ppm level was able to promote root length and the total dry weight of vetiver grass.