

ABSTRACT

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EFFECT OF ASSOCIATIVE NITROGEN FIXING BACTERIA AND PLANT GROWTH REGULATORS ON VETIVER GRASS

BY

BUNYARIT SINKANGAM

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Chairman : Dr. Settha Siripin

Department/Faculty : Department of Agronomy, Faculty of Agricultural Production

The objectives of the study on the effect of associative nitrogen fixing bacteria and plant growth regulators on vetiver grass were : (i) to screen associative nitrogen fixing bacteria from vetiver root; (ii) to study the effect of nitrogen fixing bacteria and plant growth regulators inoculation on vetiver grass *in vitro* condition; and (iii) to study the effect of nitrogen fixing bacteria and plant growth regulators inoculation on vetiver grass in pot condition.

The results of experiment 1 revealed that seventeen isolates of associative nitrogen fixing bacteria were screened from the vetiver root which were collected from areas in Chiangmai and Chiangrai provinces. These include five isolates(HL) from Ban Huaylarn, Sankampang district (Chiangmai); four isolates(LDS) from Land Development Station, Muang district (Chiangrai); four isolates(CR) from Ban Maekaotomloun, Muang district (Chiangrai); two isolates(CR) from Ban Pongpufuang, Maesuy district (Chiangrai); and two isolates(CR) from Ban Teendoi, Maesuy district (Chiangrai). All isolates were classified by morphological, physiological and biochemical characteristics particularly by carbon source used. The isolates that used glucose as carbon source were found to be similar to *Azotobacteraceae* bacteria group; the isolates that thrived on

sucrose as carbon source were similar to *Enterobacteriaceae* bacteria group; and the isolates that used malic acid as carbon source were similar to *Spirillaceae* bacteria group. The isolate with the highest nitrogen fixing ability as measured by Acetylene Reduction Activity (ARA) was CR10 isolate; 469.512 nmoleC₂H₄/sample/day.

The results of experiment 2 showed that nitrogen fixing bacterial inoculation had an effect on vetiver grass under *in vitro* condition, particularly, by producing the highest lateral root dry weight and number of tillers, in addition to the plant height, root length, lateral root number, branch root number, root dry weight, culm dry weight and total dry weight, which were different from the uninoculation. These results were affected by the nitrogen fixing capability of bacteria and plant growth regulators which were produced by nitrogen fixing bacteria. Inoculation of plant growth regulators such as GA affected plant height; IAA affected root length; and IBA affected lateral root number.

The results of experiment 3 indicated that nitrogen fixing bacterial inoculation affected vetiver grass in pot condition particularly, by giving the highest total dry biomass in culm dry weight, root dry weight and total dry weight when compared to plant growth regulators application. Results in plant height, tillering and root length tended to indicate better growth after nitrogen fixing bacterial inoculation especially the highest tillering (42.50 tillers per culm) when compared to GA application. IAA and IBA application at the high level concentration also provided an effect on growth retardation with a decreased growth of vetiver grass especially on the upper plant parts.