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The effect of Indole Acetic Acid producing rhizosphere bacteria isolated from forest soil on the seedling vigor, growth of host and non-host plants and host nutrition level of crops grown in different soils

Gangathilaka K.M.S.M.* , Chandrasekara P.W.I.M. , Hettiarachi S.**

Department of Biological Sciences, Rajarata University of Sri Lanka, Mihintale, Sri Lanka

**shashimalmi@gmail.com,*

***meks.im25@gmail.com*

Abstract

Many rhizosphere microorganisms are capable of producing Indole Acetic Acid which enhances plant growth and they may be developed as biofertilizers to enhance the uptake of nutrients from nutrient poor soils. The direct effect of IAA would include improving seedling vigor and plant growth. Rhizosphere bacteria producing IAA were isolated from Maize, Cucumber, Chili and Soy bean to investigate their effect on nutrition of the host plants in different soils and the effect on seedling vigor and growth of host and non-host plants. Eight isolates from maize, four from cucumber and two each from Soy bean and Chili were obtained following using Salkowski method. They were *Staphylococcus* sp. (seven), *Bacillus* sp. (seven), *Serratia* sp. (one) and *Pseudomonas* sp. (one). The presence of IAA was confirmed with thin layer chromatography and was quantified using a colorimetric method. The effect on vigor and growth of isolates from different hosts on host and non-host plants was determined using a pot assay where they were cultivated in forest soil inoculated by mixing isolates from different hosts separately. The effect on seedling vigor was investigated also by conducting a glass tube experiment. A hydroponic assay was conducted by inoculating single strains on the roots of their respective host plants to assess their effect on nutrition. Each crop was inoculated with the rhizosphere isolates of the same crop in different soil types. The plants were analyzed for Nitrogen, Phosphorus, Potassium and chlorophyll. Maize isolates generally had a positive effect on vigor and growth of host and non-host plants. Although some pattern in effect was observed the results are irregular and unpredictable. The isolates from Maize, Soy and Cucumber increased the host nutrient levels. The effect of inocula varied with soil type. The highest nutrient absorption of host plants compared to the control was observed in nutrient poor soils. As such these microorganisms may be suitable as bioinoculants which enhance the plant nutrition in nutrient deficient soils. Therefore while IAA forming rhizosphere bacteria are good candidates as bioinoculants, great caution is required in their use the effect is different depending on the inoculum and soil type. Researching in holistic approach is recommended.

Keywords: Auxin, Bio fertilizer, Salkowski, Nutrition, Soil