Plant Growth Promotion and Alleviation of Stresses by *Azospirillum* in Sustainable Banana Cultivation

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Introduction

Banana is a potential fruit crop of Malaysia with an ever-increasing production rate. High amounts of inorganic fertilizers are being used for cultivation of this crop. This is costly and causes environmental hazard. *Azospirillum*, a diazatrophic bacteria, has gained prominence worldwide for its potential as a biofertilizer and bioenhancer. This novel organism promotes growth of the host plant through enhanced root growth and plant nutrient uptake.

Materials and Methods

A six-week pot experiment was undertaken to observe the effect of *Azospirillum* inoculation on root stimulation, plant growth and nutrient uptake in banana plantlets. Thirty days old tissue-cultured banana plantlets cv.'Berangan' (*Musa* spp. desert type) was grown hydroponically in 4 L nutrient solution. The three treatments were: inoculation with *Azospirillum brasilense* (Sp7), plant nutrient solution and dead bacterial cells (DBC) and plant nutrient solution only. The pots were aerated using air pumps at six-hourly intervals to ensure an uninhibited root respiration and bacterial growth.

Results and Discussion

Results showed that *Azospirillum* inoculation significantly increased overall plant growth. Plant height, leaf number, leaf area, plant girth and shoot mass were significantly increased compared to control. Root mass, volume, length and number were also increased compared to uninoculated and dead bacterial cell treatments. Higher concentrations of P, K and Mg were recorded in stems and roots and Ca in the roots only. Total uptake of N, P, K, Ca and Mg increased significantly in inoculated plants while no difference was found between uninoculated and DBC-treated plants.

Conclusions

It is recommended that *Azospirillum* be used as a bioenhancer and biofertilizer for early development of banana seedlings.

Benefits from the study

The findings have introduced a new Plant Growth Promoting Rhizobacteria as bioenhancer and biofertilizer for commercial production of bananas.

Patent(s), if applicable:

None

Stage of Commercialization, if applicable:

Not aplicable

Project Publications in Refereed Journals:

None

Project Publications in Conference Proceedings

1. **Shamsuddin, Z.H.,** Marziah, M., Ismail, M.R. and Yusof, M.K. (1999). Root growth and nutrient uptake by banana seedlings under submerged condition and field capacity. Proc. 1st. *National Banana Seminar* (23-25 Nov.1998). Genting. Malaysia. P. 250-255.

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