

# Study on direct mechanism of growth promotion of soybean

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Nine isolates of soil bacteria were tested *in vitro*. for direct mechanism for the growth promotion of soybean. Parameters assessed was siderophore production. Siderophores production was tested by CAS assay as well as types of siderophores were also determined whether it was hydroxamate or catecholate type.. Five isolates, NM/S1/CA, NM/S4/NA, NM/S5/NA, NM/R2/RA, NM/R3/RA showed siderophore production.

**Key words :** PGPR, Growth promotion, Siderophores, IAA, Soybean

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## INTRODUCTION

The microbe-plant interaction in the rhizosphere can be beneficial, neutral, variable or deleterious for plant. Rhizobacteria that can exert beneficial effects on plant development are termed plant growth promoting rhizobacteria (PGPR) (Kloepper and Schroth 1978). The term rhizobacteria is used for bacteria that aggressively colonize the rhizosphere (Subbarao, 1999). It is evidenced from the previous studies conducted in different laboratories that rhizobacteria are attached to seed and root exudates by chemotaxis which rightly said as first step in seed and root colonization.

Although the mechanisms by which PGPR promote plant growth are not yet fully understood, many different traits of these bacteria are responsible for growth promotion activities (Cattelan *et al.*, 1999). Initially, *Azotobacter* and *Azospirillum* were believed to promote plant growth due to their ability to fix dinitrogen. Later it was known that other plant growth stimulating hormones such as IAA was also involved (Kennedy, 1998). The use of p-solubilizing bacteria was reported to increase plant growth in some cases, but in other cases it was not. It indicated that other mechanisms may involve in growth response (De Freitas, *et al.* 1997).

Plant growth promoting rhizobacteria enhance plant growth by direct or indirect mechanisms (Glick *et al.*, 1995). Plant growth promoting rhizobacteria enhance plant

growth by producing different metabolites which are responsible for the growth promotion of plants by direct mechanism, such as production of plant hormones like indoleacetic acid (IAA), gibberellic acid, cytokines, ethylene and production of siderophores. Production of various acids which can solubilize phosphate and make it available to the plants (Edi Husen, 2003).

Present Investigation was aimed to assess the potential of bacterial isolates to promote the growth of soybean by direct mechanism.

## RESEARCH METHODOLOGY

All the chemicals used for the present research work were procured from Glaxo, Mumbai and Hi Media Pvt. Ltd. Mumbai. The glassware used here of Borosil make and were cleaned with 6 N HCl, rinsed with distilled water and oven dried before use.

Microorganisms NM/S1/CA, NM/S3/NA, NM/S4/NA, NM/S5/NA, NM/S6/NA, NM/S7/NA, NM/S8/CA, NM/R2/RA, NM/R3/RA were isolated from rhizospheric soil of soybean from different locations and were tested for their ability to produce siderophores.

### Study of direct mechanism for plant growth promotion :

#### Siderophore production :

For siderophore production, Iron restricted succinate