Rhizobium-PVK23 Improve Plant Growth and Nodulation of Mucuna (Mucuna pruriens)

*V.K. Deshwal and Kavita Vig

Department of Microbiology, Doon (P.G.) Paramedical College, Dehradun-248001, Uttarakhand, India
*Correspondences Author E-mail: vishal_deshwal@rediffmail.com

Abstract

In previous study selected Rhizobium-PVK23 significantly enhanced seed germination, plant length, plant weight and nodule number in Peanut (Arachis hypogaea L.) (1). So aim of present study was to evaluate the plant growth activity of Rhizobium-PVK23 to improve Plant growth and nodulation of Mucuna (Mucuna pruriens). Pot experiment was conducted for evaluated the plant growth of Rhizobium-PVK23 and Total two treatments was prepared and these are Rhizobium-PVK23 and control (uninoculated) seed. Rhizobium-PVK23 enhanced the plant weight and height of Mucuna by 179 and 121.3% respectively as compared to control. Rhizobium-PVK23 coated seed enhanced nodule per and Fresh weight of nodule per plant.

Key ords: Rhizobium, PGPR, Mucuna

Introduction

Now a days, scientist are searching new alternative of chemical fertilizer. Biofertilizer can promote plant growth and productivity has internationally been accepted as an alternative source of chemical fertilizer. These rhizobacteria effectively colonize plant root and increases plant growth by production of various plant growth hormones, P-solubilizing activity, N2 fixation and biological control activity (2). Mucuna pruriens belongs to the family Fabaceae. It has some medicinal value and it is also food –feed crop. The roots are bitter, sweet thermogenic emollient, stimulant, purgative, aphrodisiac and diuretic. The leaves are aphrodisiac. The seeds are astringent, laxative, anthelmintic, alexipharmic and tonic (3). A clinical study confirmed the efficacy of the seeds of Mucuna pruriens in the management of Parkinson’s disease by virtue of their L-DOPA content (4). M. pruriens has been shown to increase male sex hormones -testosterone levels (5). Deshwal and Vig (1) were isolated and
characterized *Rhizobium*-PVK23 and observed that significantly enhanced seed germination, plant length, plant weight and nodule number in Peanut (*Arachis hypogaea* L.). Further, objective of this study was the evaluate effect of *Rhizobium*-RVK21 on plant dry weight, plant height, number of nodule and nodule fresh weight per *Mucuna pruriens* plant.

**Materials and Methods**

*Rhizobium strains:* *Rhizobium*-PVK23 was already characterized strain and selected for present study. Rhizobia were maintained on yeast extract mannitol agar (YEMA) at 4°C (6).

**Pot experiment**

*Seed bacterization:* *Mucuna* seeds were surface-sterilized with 0.5% NaOCl solution for 1–2 min, rinsed in sterilized distilled water and dried under a sterile air stream. Cells of *Rhizobium* strains were grown under continuous shaking condition (150 rpm) on YEM broth at 28 ± 1°C for 24h. Each culture was separately centrifuged at 7000 rpm for 15 min at 4°C. The culture supernatant was discarded and the pellets were washed with sterile distilled water (SDW) and resuspended in SDW to obtain a population density of 10^8 cfu ml^{-1}. The cell suspension was mixed with 1% carboxymethylcellulose (CMC) solution. The slurry was coated separately on the surface of *Mucuna* seeds and allowed to air-dry overnight in aseptic condition. Care was taken to avoid clumping of seeds. The seeds coated with 1% CMC slurry without bacterial strains served as control.

*Pot size and sterilization of soil:* Sterile earthen pots (24 cm × 12 cm × 12 cm) were filled with sterilized sandy loam soil (0.24% total organic matter, 0.096% total organic C, 37% water-holding capacity, pH 6.3).

*Treatments:* Total 02 treatment was prepared and these are *Rhizobium*-PVK23 and control (uninoculated) seed. Four seeds per pot were sown in each treatment. After 15 days, thinning was done to raise only single healthy plant in each pot. The plants were irrigated with sterilized water whenever required. Plant data such as plant dry weight, plant height, number of nodule and nodule fresh weight per plant were recoded after 45 days of sowing.

**Results and Discussion:**

*Rhizobium*-PVK23 bacterized Mucuna seeds enhanced the plant weight and height by 179 and 121.3% respectively as compared to control. *Rhizobium*-PVK23 coated seed enhanced nodule per and Fresh weight of nodule per plant (Table 1). Similarly, Deshwal et al., (7) observed that plant growth promoting rhizobacteria enhanced the plant growth. Mai et al., (8) reported that PGPR inoculation significantly increased the root properties (length, volume, mass) and shoot growth, the plant height (42-50%), leaf area (128-134%). Anandaraj and Leema Rose delepierre (9) stated that
Biofertilizer is a natural product carrying living microorganisms derived from the root or cultivated soil so they do not have any ill effect on soil health and environment. *Mucuna pruriens* is a nitrogen fixer and has great medicinal value, and our results indicated that *Rhizobium-PVK23* bacterized seed increased the plant dry weight and plant height, nodule number as well as nodule weight. We concluded on the basis of all above information and our results suggested that PGPR are better due to non-toxic to the environment and also improves the plant growth as well as productivity in *Mucuna* plant.

**Table 1**: Effect of bacterization with *Rhizobium-PVK23* on plant dry weight, plant height, nodules per plant and fresh nodule weight of *Mucuna pruriens*.

<table>
<thead>
<tr>
<th>Growth parameter</th>
<th><em>Rhizobium-PVK23 + Seed</em></th>
<th>Seed (without inoculum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry plant weight (g)</td>
<td>4.613 ± 0.21</td>
<td>2.577 ± 0.19</td>
</tr>
<tr>
<td>Plant height (cm)</td>
<td>392 ± 4.0</td>
<td>323 ± 3.5</td>
</tr>
<tr>
<td>Nodules per plant</td>
<td>47 ± 5</td>
<td>NO</td>
</tr>
<tr>
<td>Fresh weight of nodule per plant (g)</td>
<td>1.90 ± 0.05</td>
<td>NO</td>
</tr>
</tbody>
</table>

Values are mean of four replicate

**References**


enhance productivity in Rice crop,” International Journal of Applied Agricultural Research: 6(1), pp. 29-33
