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**Effect of Natural IAA Produced by *Streptomyces* Strain ACM37 on Seed Germination and Seedling Growth**

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**Abstract**

Biofertilizers play an important role in sustainable agriculture by improving soil fertility, crop tolerance and crop productivity. In this context, exploitation of plant growth promoting rhizobacteria with various beneficial properties is challenging. This study aimed to investigate the plant growth promoting activity of indole-3-acetic acid (IAA)-producing actinomycetes strain, *Streptomyces* ACM37 on the seed germination and seedling growth at early stage. The ACM37 was grown in starch-casein broth for 7 days at 28° C, 80 rpm and supplemented with 50 mg/l L-tryptophan to induce IAA production. After 7 days, IAA concentration in cell-free culture broth was quantified by following the Salkowski's method and it was 50 mg/l. Seed germination and seedling growth of cowpea (*Vigna unguiculata*) and rice (*Oryza sativa* L.) at different concentrations of IAA were estimated as % seed germination, number of roots, primary root length and length of hypocotyl. Initially, seeds were surface sterilized with 10% (v/v) NaOCl and soaked in 10, 20, 30, 40 and 50 mg/l crude IAA preparations for 1 h at 30° C. As controls, seeds were soaked in sterilized distilled water (SDW) and 50 mg/l synthetic IAA. Ten seeds per each treatment with three replicates were placed on 0.8% (w/v) water-agar in Petri plates and incubated in dark at 30° C. The % seed germination of ACM37-IAA-treated cowpea and rice seeds was enhanced at all concentrations compared to SDW and synthetic IAA treatments after 3 days. The highest 100% germination of cowpea was given at 10 mg/l IAA while it was 96.67±3.33% in >30 mg/l IAA in rice. Similarly, there was a significant ( $P<0.05$ ) increase in primary root length and number of lateral roots in cowpea at 10 mg/l of ACM37-IAA. Overall, ACM37 showed significant plant growth promotion in cowpea at low concentration (10 mg/l) of IAA whereas there was a significant ( $P<0.05$ ) reduction at high concentrations (>10 mg/l). On the other hand, there was no apparent increase in all growth parameters except seed germination in rice at all concentrations. It appears that high concentrations of ACM37-IAA may be required to promote plant growth in rice. Overall results highlight that plant growth promotion activity of ACM37 varies at different IAA concentrations and different plant species, probably between monocot and dicot species. Therefore, ACM37 has potential application as a plant growth promoting agent in biofertilizers and plant growth inhibiting agent in bioherbicides at certain IAA concentrations.

**Keywords:** Actinomycetes, Biofertilizer, Bioherbicide, IAA