



Biocontrol and plant growth promotion potential of *Streptomyces* isolated from vermicompost

S. Gopalakrishnan^{1*}, P Humayun¹, V Srinivas¹, R Vijayabharathi¹ and B Ratna Kumari¹

¹*International Crops Research Institute for the Semi-Arid Tropics (ICRISAT),*

*Patancheru 502 324, Andhra Pradesh, India; * E-mail: s.gopalakrishnan@cgiar.org*

Abstract

Three strains of *Streptomyces* spp. (CAI-21, CAI-26 and MMA-32) were earlier reported by us as having potential for biocontrol (against sorghum charcoal rot disease caused by *Macrophomina phaseolina*) and plant growth promotion (PGP) traits. In the present investigation, the three *Streptomyces* spp. were characterized for their physiological traits (salinity, temperature, pH and antibiotics resistance pattern) and further evaluated in field conditions for their PGP potential on rice, grown under the system of rice intensification (SRI) methods. All the three *Streptomyces* spp. were able to grow in NaCl up to 12% (except MMA-32 which grew only up to 6% NaCl), pH range between 5 and 13, and temperature range between 20 and 40°C. In the antibiotic resistance pattern studies, all the three cultures were found highly resistant to ampicillin and trimethoprim (>800 ppm), sensitive to chloramphenicol, kanamycin and nalidixic acid (50–100 ppm) and highly sensitive to streptomycin and tetracycline (5–25 ppm). The *Streptomyces* spp. when evaluated for their PGP activity on seedlings of rice (variety Sampada), % germination and shoot and root lengths were significantly enhanced over the control. In the field trials, the *Streptomyces* spp. significantly enhanced the panicle length, filled grain numbers and weight, panicle weight, 1000 seed weight, tiller numbers, total dry matter, root length (39–65%), root volume (13–30%), root dry weight (16–24%) grain yield (9–11%) and stover yield (11–22%) over the control. In the rhizosphere soil profile (0–15cm), actinomycetes population, microbial biomass carbon (27–83%) and nitrogen (24–43%), dehydrogenase activity (34–152%), available P (13–34%) and N (30–53%) and % organic carbon (26–28%) were found significantly higher at harvesting stage. This study further confirms that the selected *Streptomyces* spp. have the potential for PGP.