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Endophytic Bacteria *Bacillus amyloliquefaciens*(Pj2) Imparted Growth Promotion and Enhanced Drought Stress Tolerance of Peanut

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Abstract

Endophytic bacteria have been described for abiotic stress mitigation and plant improvement. The present study aims to isolate the endophytic bacteria from stress-tolerant *P.juliflora* plant roots and evaluate properties of PGP *in vitro* and the effect of endophyte in non-host plants *i.e,* peanut (*Arachis hypogaea* L.) under drought stress conditions. Among the fifteen individual endophytic bacterial strains isolated, five strains (Pj2, Pj4, Pj6, Pj10, Pj12) displayed drought tolerance. Further, one of the selected strains *Bacillus amiloliquefaciens* TG4 (Pj2), produced extracellular enzymes and plant growth-promoting activities. Plant growth-promoting activity of Pj2 in a non-host crop, the peanut, was established by infecting it, and its effect was studied in induced drought stress for ten days. The Pj2 inoculation positively affects peanut growth morphological and biochemical parameters under irrigated and drought stress conditions compared to non-inoculated plants. Our data suggest that peanut plants can be colonized with the endophytic bacteria for improved drought tolerance.

Keywords: Drought stress, Peanut, Endophytic bacteria, Plant Growth promotion bacteria, *Bacillus amiloliquefaciens*

Introduction:

The steady rise in the global population demands 50 percent more food than the current production in three decades (1). The gap between population growth and food is increasing. On the contrary, the change in the global climate and rise in the atmospheric temperature make the dry climatic zones drier and more wet climatic zones to the damper. The lack of precipitation in the dry climatic zones increases the prolonged drought stress. It was estimated that by the year 2030, water shortage due to the prolonged drought in several parts of the globe might affect 40% of the population; as a result, 700 million people, livestock, and crops will be at risk (2, 3). Several abiotic factors also severely affected plant growth and yield (4,5,6). Thus, to take up the challenge, there is imperative to develop multi-stress tolerant crops (7,8).

Advanced technologies like genetic engineering (GE) and breeding by marker-assisted selection (MAS) have enormously accelerated the generation of high-yielding stress-tolerant crop plants (9). Due to regulatory issues, several countries have not accepted the cultivation of genetically engineered crop plants (10,11). Recently, the scientific community developed a novel eco-friendly, cost-effective strategy using the microbial community to develop stress-tolerant crop plants. Research findings suggest that plant-microbe interaction boosts the plant's natural defense mechanism