

# **Development of *Bacillus safensis* based Liquid Bioformulation for Management of Leaf Spot Disease Caused by *Alternaria alternata* and Growth enhancement of *Mentha arvensis***

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**Abstract**—Chemical fertilizers are used to enhance the production and protection of agricultural crops since many years. Although, these chemicals increase the crop yield, but also affect the soil microflora and cause several other hazards. To overcome this problem, an economically attractive and ecofriendly technique of using liquid bioformulations are increasing day by day. In present study, isolate STJP from rhizosphere of *Stevia rebaudiana* was identified as a *Bacillus safensis* and displayed plant growth promoting activities such as production of IAA, siderophore, ammonia, solubilization of phosphate, zinc and potassium. *B. safensis* STJP shown the antagonistic activity against *A. alternata* as confirmed by scanning electron microscopy. Subsequently four types of glycerol based liquid bioformulations were developed from the strain STJP. Among them, paneer whey based liquid bioformulation (PWLB) was found to be most efficient in comparison to other liquid bioformulations on the basis of self-life, pH, and moisture content. Therefore PWLB was found as a cheap and efficient bioformulation and as a modern approach for growth enhancement and disease management of *Mentha arvensis* for sustainable agriculture.

**Keywords:** Agriculture crops, Bioformulation, Ecofriendly technique, PGPR.