

## SPECIMEN FORMAT FOR THESES OF MONTH

<b>Faculty</b>	<b>:</b>	<b>Science</b>
<b>Department</b>	<b>:</b>	<b>Biochemistry</b>
<b>Branch/ Area:</b>	<b>:</b>	<b>Biochemistry</b>
<b>Sub Subject Heading:</b>	<b>:</b>	<b>Biochemistry</b>
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<b>Title of the thesis</b>	<b>:</b>	<b>Bio-management of Root rot and Leaf spot disease of Stevia rebaudiana using Plant Growth Promoting Rhizobacteria</b>
<b>Nomenclature of Degree:</b>	<b>:</b>	<b>Ph.D</b>
<b>Month &amp; Year of Enrolment:</b>	<b>:</b>	<b>December 2008</b>
<b>Month &amp; Year of Registration:</b>	<b>:</b>	<b>December 2008</b>
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<b>Name of Supervisor</b>	<b>:</b>	<b>Dr. Anitha Subash</b>
<b>Designation of Supervisor</b>	<b>:</b>	<b>Professor</b>

**Centre/department/school in which research was conducted** : **Department of Biochemistry**

**University's Name & Address** : **Avinashilingam University  
Coimbatore -641043**

**Abstract within 300 words** : **BIO-MANAGEMENT OF ROOT ROT AND LEAF SPOT  
DISEASES IN STEVIA REBAUDIANA USING PLANT  
GROWTH PROMOTING RHIZOBACTERIA**

**Abstract :**

*Stevia rebaudiana* Bertoni, a natural sweetener contains two main sweetest compounds, stevioside (ST) and rebaudioside A (R-A), tasting about 300 and 450 times sweeter than sucrose, respectively. This commercially important plant also suffers by a root rot disease caused by the fungus *Sclerotium rolfsii* and leaf spot disease caused by *Alternaria alternata* in various districts of Tamil Nadu, India. In the present study, ten isolates of fluorescent pseudomonads and ten isolates of *Bacillus subtilis* were evaluated for their ability to control root rot and leaf spot in *Stevia* (*Stevia rebaudiana* Bertoni). These isolates were characterized as *Pseudomonas fluorescens* and *Bacillus subtilis* based on biochemical tests and molecular characterisation. Among these isolates, *P. fluorescens* isolate AUPF6 and AUPF5 and *Bacillus subtilis* isolates AUBS2 and AUBS5 showed the maximum inhibition of mycelial growth of *Sclerotium rolfsii* and *Alternaria alternata*. They also increased plant growth in *Stevia* apart from reducing the root rot and leaf spot incidence under greenhouse condition. The isolates AUPF6 and AUPF5, AUBS2 and AUBS5 were further tested for their ability to induce production of defense related enzymes and chemicals in plants. Significantly increased activities of phenylalanine ammonia lyase (PAL), peroxidase (PO) and polyphenol oxidase (PPO) were observed in *P. fluorescens* isolates AUPF6 and AUPF5 and *Bacillus subtilis* isolates AUBS2 and AUBS5 pretreated *stevia* plants challenged with *Sclerotium rolfsii* and *Alternaria alternata*. Moreover, higher accumulation of phenolics was noticed in plants pretreated with *P. fluorescens* isolates AUPF6 and AUPF5 *Bacillus subtilis* isolates AUBS2 and AUBS5 challenged with *Sclerotium rolfsii* and *Alternaria alternata*. Thus, the present study shows that in addition to direct antagonism and plant growth-promotion, induction of defense-related enzymes involved in the phenyl propanoid pathway collectively contributed to enhance resistance against the invasion of *Sclerotium rolfsii* and *Alternaria alternata* in *Stevia* plants.

**Major objectives** : Isolation and characterization of antagonistic bacteria from rhizosphere through morphological, biochemical and molecular tests.

➤ *In vitro* screening of *P. fluorescens* and *B. subtilis* isolates against *S. rolfsii* and *A. alternata*

- Analysis of secondary metabolites such as hydrogen cyanide (HCN), siderophores, salicylic acid, indole acetic acid (IAA) and chitinase in PGPR
- Development of talc-based bioformulations of PGPR
- Evaluation of the efficacy of PGPR bioformulations against *Sclerotium rolfsii* root rot and Alternaria leaf spot of *S. rebaudiana* under greenhouse condition
- Effect of rhizobacteria on the induction of defense related compounds in *S. rebaudiana* plants

**i) Hypothesis:** Efficacy of talc-based powder formulation of bacterial antagonists (*Pseudomonas fluorescens* and *Bacillus subtilis*) in the management of root rot and leaf spot diseases of *Stevia*

**Methodology :** . **PHASE I: Characterization and Screening of Plant Growth Promoting Rhizobacteria (PGPR)**

**PHASE II : Testing for Antimicrobial compounds**

**PHASE III: Efficacy of Talc- based formulations against Stevia diseases**

**Findings:** Plant growth promoting rhizobacteria such as *Pseudomonas fluorescens* and *Bacillus subtilis* could be isolated from the rhizosphere soils of different crop plants of Tamil Nadu and confirmed through morphological, biochemical and molecular characterization and the talc-based formulation of *Pseudomonas fluorescens* isolate AUPF6 and *Bacillus subtilis* isolates AUBS2 could be employed in the management of root rot caused by *Sclerotium rolfsii* and leaf spot disease caused by *Alternaria alternata* in *Stevia rebaudiana* plants effectively.

### **Examiners**

Internal Examiner : Dr.Mohammad Saifullah  
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External Examiner : Dr. J.R. Rao  
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