

1. A review of literature has been presented to focus plant growth promotion and disease control by biological agents.
2. Materials used and methods followed have been presented in Materials and Methods.
3. Microorganisms were isolated from rhizosphere of tea in different regions of Darjeeling and Dooars. Screening of rhizobacterial was carried out against root rot pathogens- *Poria hypobrunnea*, *Fomes lamaoensis*, *Sphaerostilbe repens* and *Sclerotium rolfsii* by dual pairing test.
4. Bacterial and fungal cultures were identified by microscopic observation and biochemical tests.
5. Five bacteria were found antagonistic to test pathogens out of which two were selected for further experimental purposes. These were identified as *Bacillus pumilus* and *Paenibacillus lentimorbus*
6. The plant growth promoting ability of the antagonistic bacterial isolates were evaluated in green house using different bacterization methods such as soil drenching, foliar application in tea and marigold and seed bacterization in chickpea and mungbean. Bacteria were applied either singly or jointly. The growth promotion of different varieties of tea seedling was observed in forms of growth parameters such as increase in shoot length, number of leaves and height. All used tea varieties show growth promotion to single and joint application of bacteria in soil. Foliar spraying with the suspension also led to significantly better growth of the shoot in tea bushes.
7. Green house experiments were conducted to study the effect of *Bacillus pumilus* on Poria root rot caused *Poria hypobrunnea*. Disease development was significantly reduced in PGPR treated plants compared to control plants.
8. The two selected bacteria were characterized *in vitro* for their cultural characteristic as well as for their plant growth promotion activities. Both the bacteria had the property of IAA production, P-solubilization, Siderophores and Volatiles.

9. Active principles were isolated from cell free culture filtrates of the two bacteria which showed antifungal activity in spores germination and radial growth bioassay. Culture filtrates were found heat stable.
10. Bioassay of solvent extracts culture filtrates also showed inhibitory activities in spores germination and radial growth of test pathogens. Diethyl ether fraction was most effective.
11. Beside plant growth promotion, biochemical changes such as chlorophyll and phenol content and enzyme activities (peroxidase, phenylalanine ammonia lyase, chitinase and β -1, 3 glucanase) were also studied. Enzyme activities as well as phenol accumulation were increased in PGPR treated plants compared to untreated control.
12. HPLC analysis was performed with the catechins extracted from leaves of tea plants treated with PGPR either by soil drenching or by foliar application. Appearances of new isoforms of catechins were observed.
13. Polyclonal antibodies (PAbs) were raised against antigens prepared from *Bacillus pumilus* and *Poria hypobrunnea*.
14. Agar gel double diffusion test were performed using crude antibody. Strong precipitin arcs were obtained.
15. The bacterial sustainability in the soil was evaluated by ELISA and Dot- blot.
16. The presence of pathogen in the soil treated with PGPRs prior to pathogen inoculation as well as in untreated plants was detected by immunological techniques such as ELISA and Dot- blot. Results revealed that pathogen population had declined in presence of PGPR.
17. PGPR formulation was developed in talcum powder. The viability of talcum formulation was tested during 60 days and 120 days of storage by ELISA. All treatment with formulation showed enhancement in growth over untreated control.