R&D MICROBIAL BIOFORMULATIONS FOR USE IN TEA

Products formulated from microbial strains of North East India

The best products for the industry available at the most competitive prices.

TRA-TRICHO-L  TRA-TRICHO-S  TRA-BST-L
TRA-META-L  TRA-PGP-L  TRA-PGP-S

Tea Research Association
Tocklai Tea Research Institute, Jorhat - 785008, Assam
www.tocklai.org
Tea plantations of North East India are affected by diverse pests and diseases. Black rot, *Fusarium* die-back, Blister blight, Red rust, Charcoal stamp rot, Brown root rot, Poria branch cum root canker etc. are the important diseases in tea, while, the Tea mosquito bug, Looper caterpillar, Red slug caterpillar, Thrips, Jassids and Termites are the major pests of tea causing considerable damage to the tea plants in terms of productivity as well as quality deterioration. The application of chemicals in tea plantation is restricted for several reasons, including, deterioration of soil quality, air and groundwater pollution, undesirable residues in made tea, escalating costs, outbreak of secondary pests and resistance development, variation in susceptibility, impedance of natural regulatory agents and lethal effects in warm-blooded animals, including humans. To overcome these constraints, TRA made significant contributions in identifying/developing certain effective biocontrol tools and growth promoters of microbial origin. These products are already proven as the most potent ones in multilocational field trials in the tea ecosystem. Considering the reality, the following R&D products are made available for the tea growers of North East India for large scale application in Tea.
A liquid version of *Trichoderma* formulation containing *Trichoderma viride* and *T. harzianum* separately, highly effective for controlling Charcoal stamp rot, Brown root rot, *Poria* branch cum root canker, *Fusarium* die back, Red rust diseases in tea. Moderately effective in controlling Blister blight and Black rot. Established as potent plant growth promoter while used as foliar spray in stressed tea sections.

**CFU load: 7.0X10⁸ cfu/ml**

**Mode of application:**
For protection of pruning cuts and hail damage: 2% cfu spray with NMD nozzles.
For controlling *Fusarium* die back, Black rot, Red rust: 2% cfu spray. The number of rounds may vary depending upon the degree of infestation.
Foliar spray in stressed tea sections: 1% cfu spray, 2 rounds at monthly interval.
TRA-Tricho-S

A quality compost based *Trichoderma* formulation containing active cfu of *T. viride* and *T. harzianum* separately, mostly suitable as broadcast in standing tea sections and in planting pits as a biopesticide for fighting against branch and root diseases of tea. Highly effective for controlling Charcoal stamp rot, Brown root rot, Branch cum root canker, Thorny stem blight.

**CFU load: 5.0X10⁸ cfu/g**

**Mode of application:**
- **In standing tea:** 150-200 kgs/ha as broadcast when the soil is sufficiently moist.
- **During planting:** 150-200 gms per planting pit mixing thoroughly with the excavated soil.

TRA-BST-L

This bioformulation contains active cfu of *Bacillus subtilis*, a phylloplane bacteria, identified as a potent biological agent for fighting against Blister blight, Black rot, Red rust and against secondary microbial infections occur after severe *Helopeltis* infestation.

**CFU load: 9.0X10⁸ cfu/ml**

**Mode of application:**
- **For controlling Black rot, Red rust, Blister blight:** 2% cfu spray, 2-4 rounds at 15 days interval (no. of rounds and interval may vary depending upon the severity of the disease)
- **After severe Helopeltis infestation:** 2% cfu spray, two rounds at 15 days interval.
This is a liquid formulation of *Metarhizium anisopliae*, a highly effective fungal entomopathogen for controlling Termite pests in tea. Useful against both scavenging and live-wood eating termites predominant in mature tea sections, in general.

**CFU load:** $7.0 \times 10^8$ cfu/ml

**Mode of application:**
Thorough drenching of affected stem and branches and collar region after forking with 5% cfu suspension during cold weather (Nov-Feb). 150-200 ml spray fluid per plant depending upon variation of age.

![Metarhizium anisopliae](image1.png)

![Spore development of *M. anisopliae*](image2.png)
TRA-PGP-L

It is a broth consortium of *Azotobacter chroococcum*, *Azospirillum brasiliense* and *Bacillus subtilis*, highly effective in enhancing the vegetative growth of tea plant as well as crop yield, both in young and mature teas. Desired level of cfu count of each bacterium is maintained above $10^6$ /ml. Established as an effective rehabilitory spray after severe pest and disease infestation.

**Mode of application:**
2% as foliar spray, 4-6 round in a year.

![Azotobacter sp.](image1)
![Azospirillum sp.](image2)

TRA-PGP-S

It is a compost based formulation of plant growth promoting (PGP) microbes comprising of *A. Chroococcum*, *A. brasiliense*, and *B. Subtilis*. Suitable for broadcasting and planting pit application.

**Mode of application:**
50-60 gm/plant in young teas.
150-250 kg/ha as broadcast in mature teas.
PRODUCTION FACILITIES CREATED AT TTRI, JORHAT
For technical information, please contact:

Dr. B.K. Barthakur,  
Consultant, Plant Protection  
Email: drbkbarthakur@gmail.com  
Phone: 9435350414

&

Dr. S.R. Sarmah,  
I/C Mycology & Microbiology Dept.,  
TRA-TTRI  
Email: drsrsarmah@tocklai.net  
Phone: 9435353033