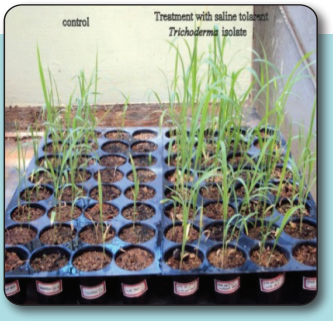
Bioformulation of salinity tolerant isolate of *Trichoderma harzianum* for biological management of plant diseases



Glasshouse trials of *T. harzianum*

Technology Description

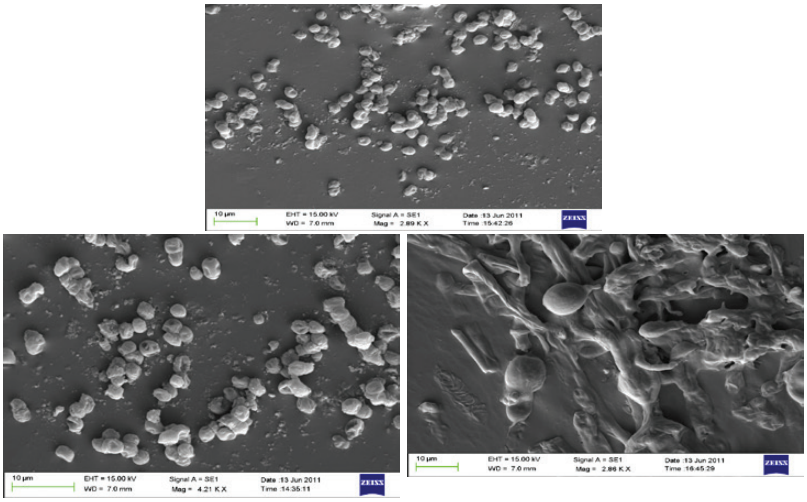
It is a bioformulation of a fungal antagonist *Trichoderma harzianum* which has the salinity tolerance (upto 2 M NaCl). It has good biocontrol potential against soil borne pathogens that has been verified by pot and field experiments with groundnut and sorghum. There is no salinity tolerant formulation of *Trichoderma* available in the market. Besides having salinity tolerance it induces tolerance in plants and protects against salinity. Pot culture experiments showed tolerance to salinity upto 2 M NaCl and potential to control soil borne pathogens of groundnut and sorghum. The isolate used not only has salinity tolerance but has potential to protect plants from salinity when applied as seed treatment or soil application. Field trials at Junagardh (5 locations) and Udupi (4 locations) clearly showed the efficiency of the formulation in controlling the soil borne pathogens in groundnut. Toxicological data required for complete registration has been developed. This can be obtained along with the cultures at the time of transfer of technology. The isolate can be maintained as dry spores in silica gel without losing the viability and other traits. The isolate can be maintained at high NaCl amended medium and *Trichoderma* production is a growing business and there is only >2-3% cropped area are covered by bioagents. In seed treatment and soil application a huge demand for the quality agents are required and the business will be very durable.

Background

Trichoderma isolates collected from groundnut and sorghum ecosystem were screened for saline tolerance at 500mM, 1M and 2M NaCl concentration. The identity of these stress tolerant isolates was confirmed using oligonucleotide barcode and identified *Trichoderma* isolates have been submitted to Genbank and accession number is obtained. Among them, Th NBAII HAR16B (*Trichoderma harzianum*) was found to be an efficient saline tolerant isolate. The bioformulation is filed for patent (2273/CHE/2011 Dt. 04/07/2011). The efficacy has been field tested for soil borne diseases of groundnut.

Benefits /Utility

This bio-formulation of salinity tolerant isolates of *Trichoderma* with biocontrol potential is applicable to the crops grown in sodic soil, and it not only helps in disease control but also induces the salinity tolerance to crop plants with increased seed germination and growth. These *Trichoderma* isolates are tolerant to 2M concentration of NaCl and have good bio-control potential. Besides their tolerance to the salinity, they can protect the plants from salinity (4800 ppm concentration of NaCl in soil) as evident from increased germination of seeds. Conventional liquid fermentation derived talc formulation as well as solid state derived talc formulations and invert-emulsion formulation from solid state derived conidia were tested for their bio-efficacy and the bio-control potential of these bio-formulations has been confirmed against *Macrophomina phaseolina* infection on sorghum. The bio-formulations of these isolates will be very useful in chemical free management of plant pathogens under saline and sodic soil conditions.



EM image of *T. harzianum*

Scalability

As there is great demand for the bioagents the production can be scaled up based on the capacity of fermentation units procured.

Business and commercial potential

There is great demand for the quality bioagents. Our country has met only less than 3% area covered with bioagents for plant disease management. *Trichoderma* seed treatment is a proven technology for managing soil borne diseases. There is huge demand.

Financial requirement

(for 50 batches in a year, each with 200 kg using 100L fermentor)

- Total Capital Investment (excluding Land and licensing fees): Rs 25 lakh
- Break of capital investment
  - Equipment – Rs. 18 lakh
  - License fee, Registration cost – Rs. 5 lakh & Miscellaneous – Rs. 2 lakh
- Variable cost (per year/unit): Rs2.5 lakh
- Break of variable cost
  - Chemicals and talc – Rs. 0.25 lakh, Packing material – Rs. 0.10 lakh
  - Electricity and rent – Rs. 0.35 lakh, Man power – Rs. 1.80 lakh
- Expected sale/unit: Rs (can take selling price of a similar product):
- No. of units to be sold for monthly break even on variable cost:

Selling price per kg	Income*(Rs. In lakhs) with 50 batches in a year each with 200 kg
Rs. 150	15 lakh
Rs. 175	17.5 lakh
Rs. 200	20 lakh

Target Market/Customer

- All types of farmers, seed producers, farmers in protected cultivation, plantation crops. This technology already commercialized to one firm.

Social impact of the technology

- Unit production cost (maximum): Rs.100 per kg
- Predicted per unit selling price of product/services generated by the technology: Rs. 175 to Rs.200 per Kg

Toxicological data

- Toxicology data for primary culture and wettable powder formulation of *Trichoderma harzianum* has been generated as per CIBRC guidelines.