

Actinobacterial Strains-Based Bio-Fungicide Composition for Controlling Plant Pathogenic Fungi and Method for Producing the Same

1. Technology:

This invention focuses on developing a bio-fungicide composition using the marine actinobacteria to control *Fusarium oxysporum*, *Alternaria solani*, *Helminthosporium oryzae*, *Macrophomina phaseolina*, and *Rhizoctonia solani* phytopathogenic fungal strains infecting the tomato (*Solanum lycopersicum* L.), mung bean (*Vigna radiata*), radish (*Raphanus sativus* L.), and paddy (*Oryza sativa*). The extremophilic actinobacteria with the ability to inhibit the fungal pathogens were screened, and 6 effective actinobacteria strains were selected, cultured, and pooled at the specified microbial concentrations. The consortium formulation was developed along with specified carrier substances to enhance the storage conditions, application mode, and field disbursement. The invented microbial consortium formulation mixed with suitable carrier substances and patented dilution ratios for broadcasting, fertigation, foliar, and soil treatment. Which effectively controlled the growth and progression of the proposed fungal strains and promoted the plant growth and yield.

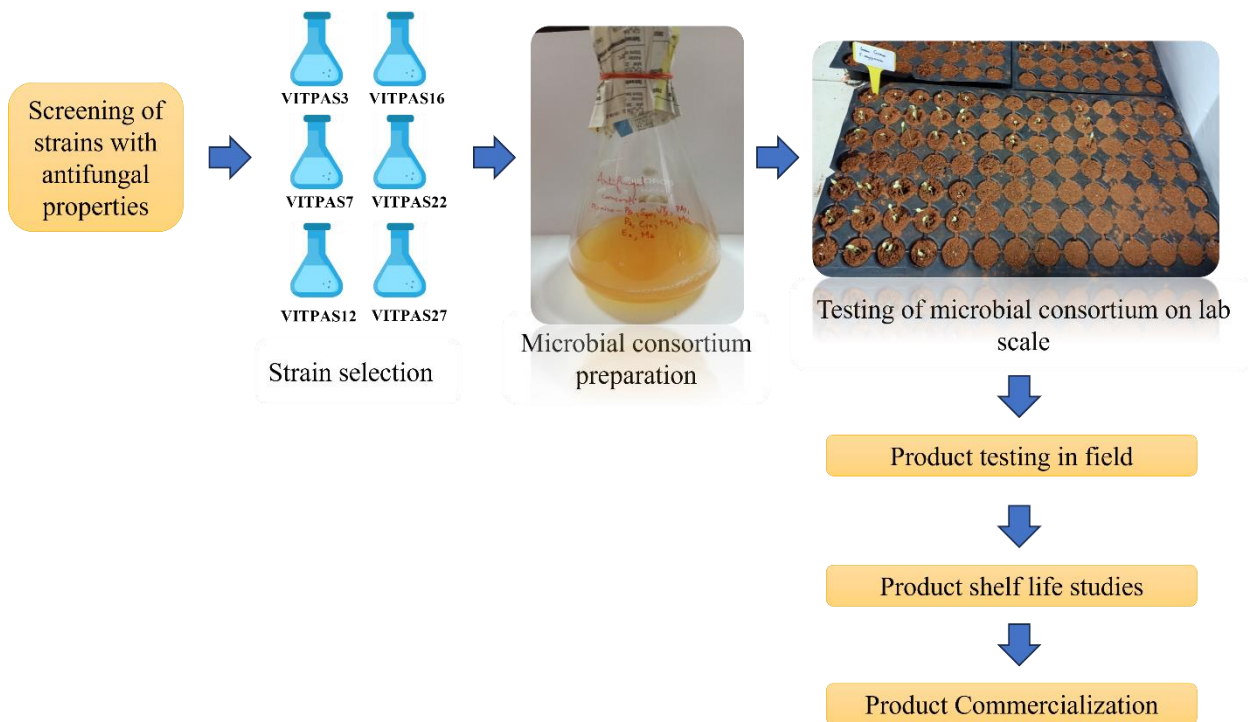


Fig. 1. Marine actinobacteria-based bio-fungicide development process.

2. Problem Addressed

Plants are important sources for humans and all living organisms. Due to the impacts of climatic changes, growth conditions, and, more importantly, disease infection, it can cause serious effects on food production, leading to food scarcity. Over the years, the increase in phytopathogen (bacterial, fungal, viral, nematodes, and pests) attacks on plants has caused devastating food losses across the

globe. Preventing such infestations is by treating the plants using chemical fungicides/pesticides. Prolonged usage and improper application of chemical pesticides can adversely affect the plants, environment (soil and waterbodies), livestock, and humans. Also, chemical pesticides are costly and require frequent applications, increasing the farmers' financial burden and food prices. Biofungicides development is the primary solution to counteract such problems. Over several years, beneficiary microbes (*Bacillus* sp., *Trichoderma* sp., and *Pseudomonas* sp.) were implemented to control and counteract the fungal infections. However, despite their limited shelf life, poor efficiency, application methods, risk of acquiring virulence, and limited spectrum against fungal pathogens, such biofungicides are often ignored. This invention mainly focuses on resolving all the issues from the existing bio-fungicides by developing a new marine actinobacteria-based biofungicide formulation, which can effectively control and inhibit a broad range of fungal pathogens, versatile application methods, has a longer shelf life, and can be applied at harsh conditions.

3. Industrial Applications:

1. The developed bio-fungicide formulation targets 5 potential fungal pathogens and can be applied to various crops.
2. It can be applied in harsh environmental conditions, such as fields with hard water, high salinity, and soil with acidic and alkaline pH.
3. It is eco-friendly, non-toxic, and non-pathogenic.
4. It is comparatively cheaper than chemical fungicides.
5. It requires lesser dosage and fewer applications compared to the existing pesticides.
6. No potential danger is caused by bio-fungicide run-off during rain and flood.
7. It has a high shelf life.

4. Patent Application Number: 202341088362