

Practice Abstract 1

Green Biofertilizers with 3in1 Effect

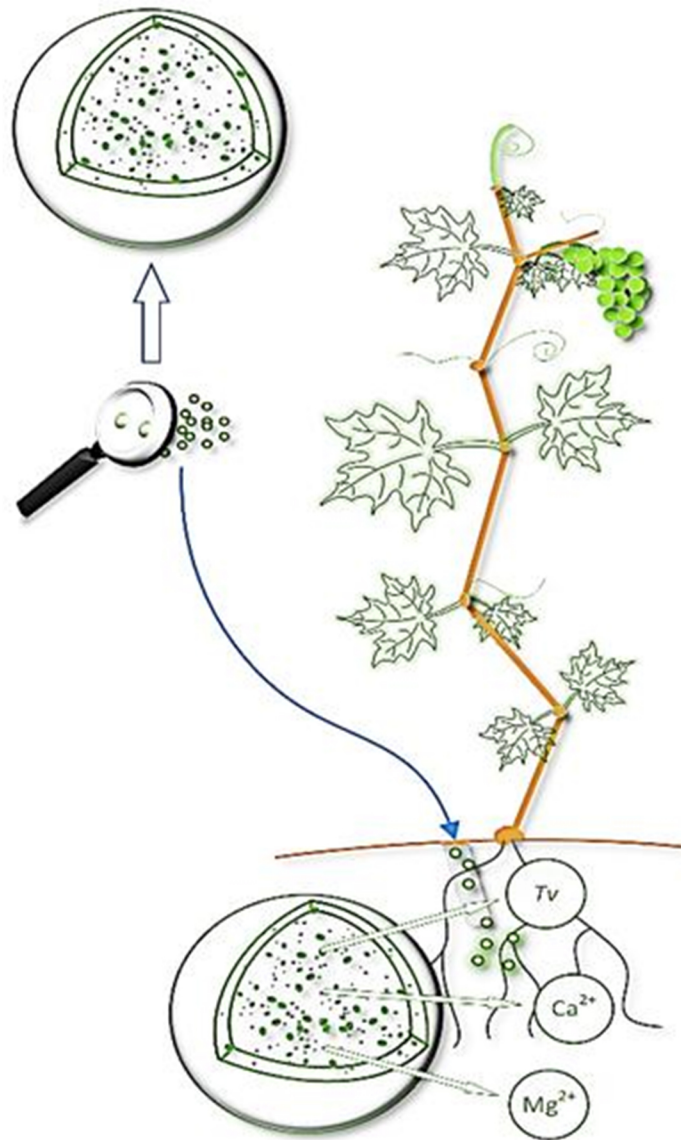
Creating biopolymer microparticles encapsulating bioactive components derived from natural sources with a 3-in-1 effect (enhanced plant nutrition, protection, and time-release mechanism) is an innovative approach to sustainable agriculture. This method aims to decrease the reliance on synthetic agrochemicals while simultaneously boosting the production of secondary plant metabolites.

This can be achieved with:

- 1. Selection of Bioactive Components** – extracts, essential oils, plant extracts rich in phytochemicals, and beneficial microorganisms like mycorrhizae or rhizobacteria.
- 2. Encapsulation in Biopolymer Microparticles:** chitosan, alginate, or gelatin.
- 3. Incorporation of Time-Release Mechanism:** Integrate a time-release mechanism within the biopolymer matrix to ensure gradual and sustained release of the bioactive compounds over an extended period.
- 4. Characterization and Evaluation:** Characterize the biopolymer microparticles for morphology, size distribution, encapsulation efficiency, and release profile.
- 5. Field Trials and Validation:** Conduct field trials to assess the performance of the biopolymer microparticles under real agricultural conditions. Monitor parameters such as crop yield, quality, pest infestation, and disease incidence. Tests are made on the fields of Faculty of Agriculture.
- 6. Scaling Up and Commercialization:** Scale up the production of biopolymer microparticles and optimize manufacturing processes for large-scale deployment.

With these steps, we develop biopolymer microparticles encapsulating bioactive components with a 3-in-1 effect, contributing to sustainable agriculture by reducing agrochemical usage and enhancing plant health and productivity.





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