



# Development of low-cost plant probiotic formulations of functional endophytes for sustainable cultivation of *Coleus forskohlii*

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Received 4 April 2019, Revised 1 August 2019, Accepted 3 August 2019, Available online 5 August 2019.



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<https://doi.org/10.1016/j.micres.2019.126310>

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## Abstract

Deployment of plant endophytes at field level is reported to make an impact on agricultural crop productivity; development and deployment of suitable crop specific plant probiotics in a suitable delivery matrix is a value-added task. In our study, we attempted to develop bioformulations of native, fungal endophytes of *Coleus forskohlii* to improve plant yield using two different carrier-based materials (talc and wheat bran). Initially, fungal endophytes (RF1, SF1, and SF2) were grown on sterilized wheat bran under solid state condition and their growth kinetics and pattern were analyzed by ergosterol content and scanning electron microscope, respectively. 10-day-grown fungal endophytic cultures were used for the development of two types of formulations (wheat bran and talc-based formulations) and tested for their efficacy on host plant, *C. forskohlii* under

field conditions. Interestingly, application of wheat bran-based endophytic formulations significantly ( $p < 0.01$ ) enhanced plant height (12–29%), number of branches (51–63%), root biomass (26–33%), photosynthetic pigments (32–101%), and forskolin content (35–56%) compared to talc-based formulations under field conditions. Shelf life of endophytes (RF1, SF1, and SF2) in both formulations revealed spore viability in wheat bran-based formulations for 6 months storage period as compared to talc-based formulations. Overall, the present investigation envisages developing plant probiotic bioformulations of functional endophytes of *C. forskohlii* to enhance root biomass and *in planta* forskolin content.

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## Keywords

Fungal endophytic bioformulations; *Coleus forskohlii*; Forskolin; Ergosterol assay; Shelf life; Field evaluation

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