

# Strategies to enhance the biocontrol potential

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Use of bio agents for control of banana Fusarium wilt there has to be a systematic approach. For the best results following points are taken into account : bio agents types with their various attributes, the problems in initial colonization of antagonists, related variation factor after initial colonization. The primary step to get effective biocontrol is to find the potential suitable bio agents. The foremost thing is the checking of antagonist's type and properties that directly or indirectly affect their efficacy, production, along with storage and transportation. Production cost of BCAs must be low. The yield should be viable and highly effective from propagules available at high concentration. These propagules must have long-term storage as dry preparations. The studies revealed that Bacillus species are ideal candidates for viable BCAs. Bacillus spp. strains are advantageous as BCAs as they have potential to survive under adverse environments by producing endospores. In present scenario, a lot of strains of Bacillus spp. have been widely applied as BCAs against soil borne plant diseases, including Rhizoctonia and Fusarium that proved to bear high biocontrol efficacy. In spite of this using Bacillus spp. strains as BCAs, the post-processing costs are easy to control. The storage and transportation conditions required could be easily fulfilled. Application of other microorganisms as BCAs, such as nonpathogenic *F. oxysporum*, *Trichoderma* spp. has also been demonstrated but having high cost of production, storage and transportation.

### **Hurdles in colonization of the antagonists**

The second thing which can be taken in consideration is colonization of antagonistic microbes. The efficacy of the BCAs depends largely on potential

of the antagonistic microbes for initially colonizing the rhizosphere and production of substances inhibiting the pathogens. There are natural barriers which hamper colonization of antagonistic microbes indicating problems encountered upon soil application of BCAs. This includes predation and phagocytosis from soil protozoa, suppression by the exudates of indigenous microbes or plant roots, fighting with indigenous microbes in different ecological sites, nutrients and energy. They drastically reduce the population of most antagonistic microbes in the first 2 to 3 days after the BCAs were applied. The BCAs must maintain a certain population so that it can result into acceptable levels of disease inhibition. To achieve promising efficacy of bio agent appropriate measures must be taken to help the antagonistic microbes get through this hard time. Best approach may be to help increase the original population of the antagonistic microbes in the BCAs ensuring a considerable part of the population to survive during this adverse phase. The recommendation is to repeatedly use BCAs for maintaining certain levels of the antagonistic microbes.