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Application of novel alkalotolerant Actinomycete spp as biocontrol agents against fungal plant pathogens and as plant growth promoters

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Application of novel alkalotolerant Actinomycete spp as biocontrol agents against fungal plant pathogens and as plant growth promoters

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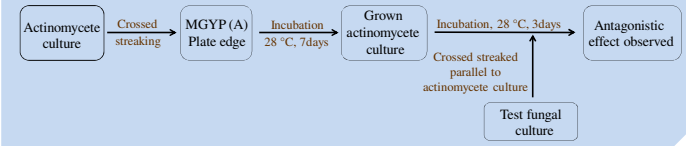
Abstract

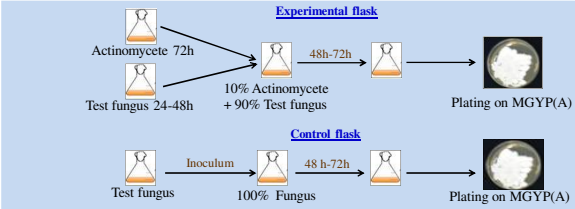
Fungal diseases of crops result in almost 20-30% loses in agricultural production world wide. Actinomycetes are well known for their ability to produce several biologically active compounds, which may have antifungal properties. Several synthetic fungicides are used in the field of agriculture. Now a days there is incresing public pressure to reduce the use of chemical fungicides. Concerns have been raised about both, the environmental impact and the potential health hazards related to the use of these chemicals. Biological control approaches an interesting substitute to synthetic fungicides. The alkalotolerant actinomycete strain A-03-1160 exhibiting antagonistic effect against several pathogenic fungi. In preliminary results in shake flasks, it was found that the actinomycete culture caused complete degradation of various fungi such as *Mucor, Aspergillus niger, Aspergillus oryzae, Alternaria solani, Fusarium moniliforme, Curvularia fallax, Curvularia lunata, Claviceps purpurea, Helminthosporium,* etc. indicating that the organism could be used as a potential biocontrol agent. Coating the seeds of *Cicer arietinum* with the spores provided protection against fungal contamination during germination as well as it promoted the growth of the plantlets.

Materials & Methods

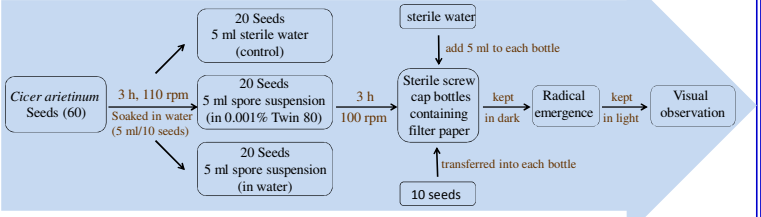
Antagonistic effect



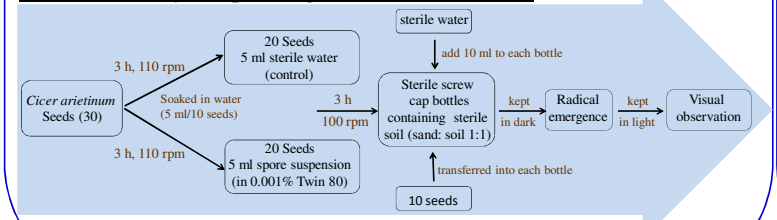
Possible biocontrol activity of actinomycete strain



Testing of biocontrol activity on *Cicer arietinum*



Effect of actinomycete spore on growth of *Cicer arietinum*



Results & Discussions

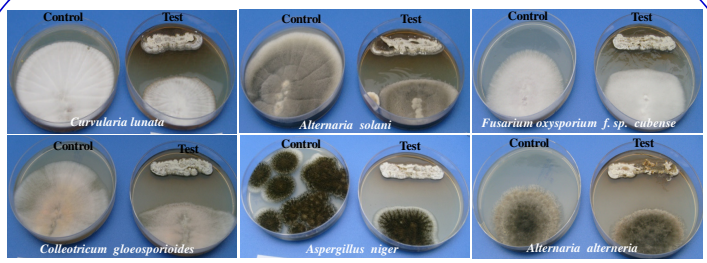
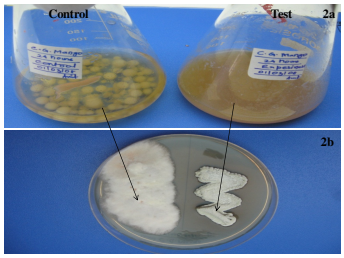
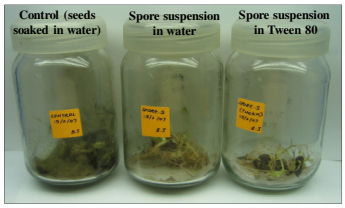


Fig 1: Antagonistic effect of the actinomycete culture against different fungi



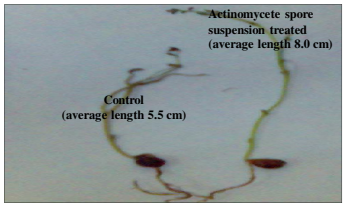
The actinomycete culture was able to grow on live fungal mycelium in a liquid culture`and degrade it. This shows that this actinomycete strain has the potential to be used a bio-control agent.

Fig 2a: Actinomycete and *Colletotrichum gloeosporioides* grown together
2b: Streaking from the relevant flask after 24 hours.



The actinomycete spores protected the seedlings of *Cicer arietinum* from fungal contamination and did not affect seed germination. This gives a lead that the culture by itself can be developed as a biocontrol agent for the direct application.

Fig 3: Testing of biocontrol activity on *Cicer arietinum*



The average plantlet length was higher when treated with actinomycete spore suspension. We may also predict that the culture probably releases some growth factors.

Fig 4: Effect of actinomycete spore on growth of *Cicer arietinum*

Conclusion

Results indicate that the actinomycete culture can be directly used as an antifungal biocontrol agent for plants. The actinomycete spores may be developed for direct application to plants or seeds to protect them against fungal contamination and to promote their growth.

Acknowledgement

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