

### **Technological University Dublin** ARROW@TU Dublin

**Conference Papers** 

Crest: Centre for Research in Engineering Surface Technology

2010-11-03

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

Swarna Jaiswal Technological University Dublin, swarna.jaiswal@tudublin.ie

Amit Jaiswal Technological University Dublin, amit.jaiswal@tudublin.ie

Follow this and additional works at: https://arrow.tudublin.ie/cenrescon

#### Recommended Citation

Jaiswal S, Jaiswal AK, & Rele MV. (2010) Application of novel alkalotolerant Actinomycete spp as biocontrol agents against fungal plant pathogens and as plant growth promoters. International Conference on Antimicrobial Research (ICAR2010), November 3rd-5th, 2010 Valladolid (Spain).

This Presentation is brought to you for free and open access by the Crest: Centre for Research in Engineering Surface Technology at ARROW@TU Dublin. It has been accepted for inclusion in Conference Papers by an authorized administrator of ARROW@TU Dublin. For more information, please contact yvonne.desmond@tudublin.ie, arrow.admin@tudublin.ie, brian.widdis@tudublin.ie.





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



Swarna Jaiswal, Amit K. Jaiswal & Minakshi V. Rele



Division of Biochemical Sciences, National Chemical Laboratory, Pune 411008, India amitjaiswal@hotmail.co.uk

#### **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 Actinomycete culture | Crossed streaking | MGYP (A) | Incubation | 28 °C, 7days | Incubation | 28 °C, 7days | Incubation | Test fungal Possible biocontrol activity of actinomycete strain Test fungus 24-48h 48 h-72h Test fungus 100% Fungu Testing of biocontrol activity on Cicer arietinum 20 Seeds add 5 ml to each bottle (control) 20 Seeds 3 h, 110 rpn 5 ml spore suspension (in 0.001% Twin 80) 3 h 100 rpm 3 h kept Visus. observation cap bottles Seeds (60) containing filter paper 20 Seeds 5 ml spore suspension (in water) Effect of actinomycete spore on growth of Cicer arietinum sterile water 20 Seeds add 10 ml to each bottle 5 ml sterile water containing sterile oil (sand: soil 1:1) kept | Radical | emergence | in light | Seeds (30) 20 Seeds 5 ml spore suspension (in 0.001% Twin 80) transferred into each bottle 10 seeds

#### **Results & Discussions**

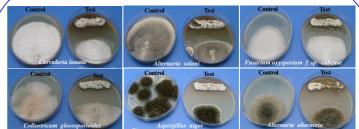


Fig 1: Antagonistic effect of the actinomycete culture against different fungi



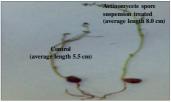
The actinomycete culture was able to grow on live fungal mycelium in a liquid culture and degrade it. This shows that this actinomycete strain has the potential to be used a bio-control agent.

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

We thank Department of Biotechnology (DBT), India for having funded the first phase of this work.