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Biological Control of Some Phytopathogenic Fungi Through Pigeon Pea Bacterial Endophytes

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Abstract
Total of 19 bacterial endophytes were isolated from the surface sterilized leaf, stem and root of pigeon pea pulse crop for studying their interactions with fungi, including phyto pathogenic fungi. Isolated strains varied in colony morphology, cell shape, size, polysaccharide production and Growth on different carbons source. All strains were translucent and had slow growth on nutrient agar. Antagonistic activity of these isolates was evaluated against major pathogenic fungi *Aspergillus species*, *Rhizoctonia bataticola* and *Fusarium oxysporum cicer* (FOC). Out of 19 strains of bacterial endophytes, 6 strains strongly inhibited the growth of Aspergillus species while remaining 13 showed moderately antibiosis against *Aspergillus* species. All the isolated strains showed moderately antibiosis against *Rhizoctonia bataticola* and *Fusarium oxysporum cicer*. Further understanding of the antagonistic activity of the endophyte bacteria will increase the possibilities of developing strategies for using these isolates for control of like- wilt in pigeon pea and other crops.

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INTRODUCTION

Pigeon pea (*Cajanus cajan*) is an important pulse crop of India and is cultivated in many part of world. Pigeon pea is the most versatile food legume and it produced more nitrogen from plant biomass/ unit area of land than any other legume. Crop yield is significantly reduced due to the diseases caused by microorganism and it is difficult to control. Some pesticides and chemicals have been recommended for the management of disease, but none have been proven to desired success in controlling the disease.[1]

Endophytes an endosymbiont often a bacterium and fungi that live within a plant for at least part of its life without causing apparent disease.[2] Endophytes may also beneficial to plants by preventing pathogenic organism by creates a "barrier effect" where the local endophytes out competed and prevent pathogenic organism from taking hold.[2-5]

MATERIALS AND METHODS

Mateirals

The pigeon pea plant was collected in and around Gwalior. The chemicals and reagents used in the study were of AR grade and were purchased from SD Fine Chemicals, Mumbai (India) or HiMedia, Mumbai (India).

Isolation of Bacterial Endophytes

Bacterial enodophytes were isolated from the leaf, stem and root of pigeon pea.[2-5] First, the plant was washed with distilled water and then plant was sterilized in 3% H_2O_2 for 2 min to surface sterilization. Under the laminar air flow the plant part (leaf, stem and root) were cut into small pieces and then place in semisolid nutrient agar with Bromo thymol blue (BTB).

Morphological Characterization of Bacterial Endophytes

Morphological characterization of bacterial endophytes were carried out on the bases of colony size, shape, elevation, Polysaccharide production, colour, consistency and growth on nutrient agar.

Antibiosis activity of Bacterial Endophytes

Antibiosis activity was tested against the plant pathogenic fungi *Aspergillus* species, *R. bataticola,* and *Fusorium oxysporum cicer*. Bacterial endophytes were inoculated on PDA agar plate in the corner by spot inoculation and incubated for 48 h at 37 ºC. After incubation, a disc of 72 h fresh fungus culture was placed in the centre of plate and incubated at 27 ºC for 5 days. After the incubation period, the diameter of fungus culture was measured.

RESULTS AND DISCUSSIONS

Total 19 bacterial endophytes were isolated from different parts of pigeon pea. Morphological feature were studied to avoid the repeatation of the same bacterial culture. (Table.1). Out of 19 bacterial endophytes, 6 bacterial endophytes strongly inhibited the growth of *Aspergillus* species and 13 showed moderately antibiosis against *Aspergillus* species. All endophytes showed moderately antibiosis against *Rhizoctonia bataticola* and *Fusarium oxysporum cicer.* (Fig 1).

Table 1. Morphological characterization of isolated bacterial endophythes from pigeon pea

Strain No-	Colony Shape	Colony Size	Elevation	Polysaccharide production	Color	Consistence	Growth
BE1	Circular	Pinpoint	Convex	No	Creamish	Translucent	Slow
BE 2	Circular	Pinpoint	Convex	Low	Creamish	Translucent	Slow
BE 3	Circular	Small	Convex	No	Yellow	Translucent	Slow
BE 4	Circular	Pinpoint	Flat	Low	Yellowish white	Translucent	Slow
BE 5	Circular	Small	Flat & rough	High	White	Translucent	Slow
BE 6	Circular	Small	Flat	Low	Creamish	Translucent	Slow
BE 7	Circular	Pinpoint	Flat	Low	White	Translucent	Slow

BE 8	Circular	Big	Convex	High	Creamish	Translucent	Slow
BE 9	Circular	Pinpoint	Flat	Low	Creamish	Translucent	Slow
BE 10	Circular	Pinpoint	Convex	Low	White	Translucent	Slow
BE 11	Circular	Moderate	Convex	High	Creamish	Translucent	Slow
BE 12	Circular	Pinpoint	Raised	High	Creamish	Translucent	Slow
BE 13	Circular	Pinpoint	Convex	Low	Creamish	Translucent	Slow
BE 14	Circular	Moderate	Raised	No	Creamish	Translucent	Slow
BE 15	Circular	Pinpoint	Convex	Low	White	Translucent	Slow
BE 16	Circular	Pinpoint	Convex	Low	Creamish	Translucent	Slow
BE 17	Circular	Pinpoint	Convex	Low	Creamish	Translucent	Slow
BE 18	Circular	Pinpoint	Convex	Low	Creamish	Translucent	Slow
BE19	Circular	Pinpoint	Convex	Low	Creamish	Translucent	Slow

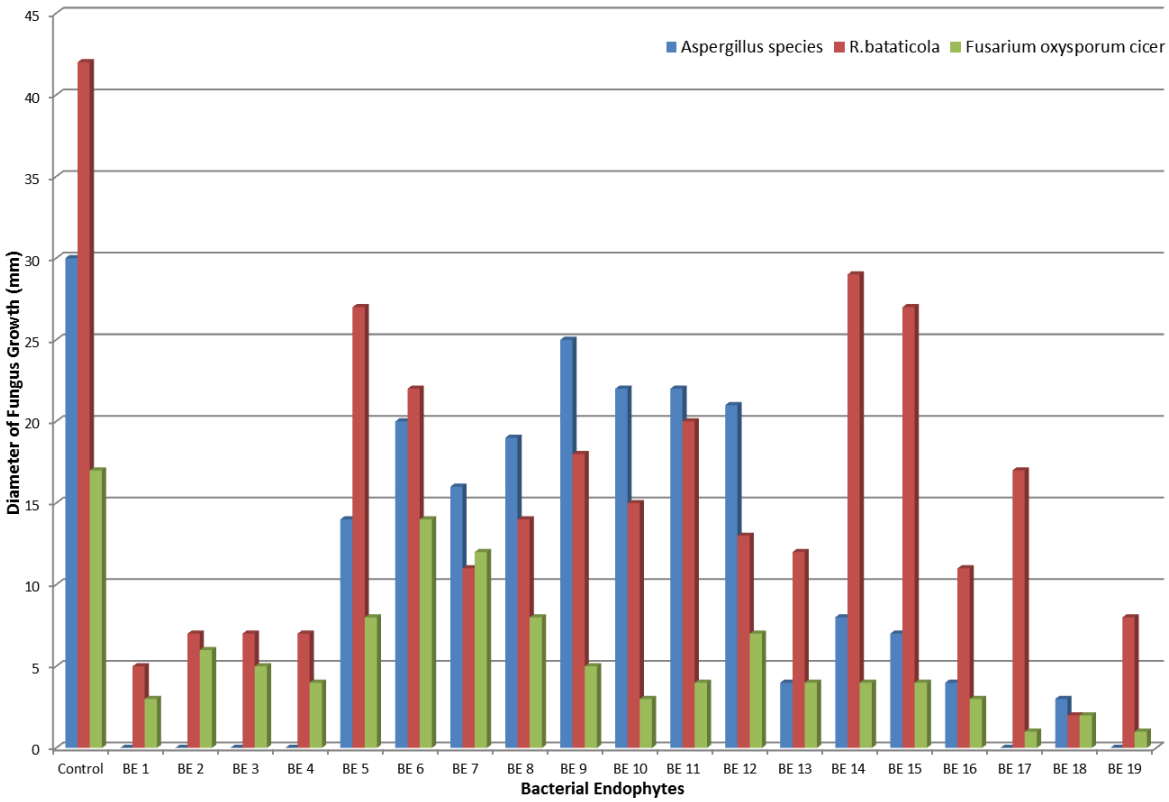

Fig 2. Antibiosis activity of bacterial endophytes isolated from pigeon pea

CONCLUSION

The conclusion of the present study showed that most of bacterial endophytes provide the protection of the pigeon pea plant against the phytopathogenic fungi *Aspergillus sp, Rhizoctonia bataticota* and *Fusorium oxysporum cicer.*

DECLARATION OF INTEREST

It is hereby declared that this paper does not have any conflict of interest.

REFERENCES

1. Singh R, Singh BK, Upadhyay RS, Rai B, Youn SL. Biological control of Fusarium wilts disease of Pigeon pea. Plant Pathol J. 2002; 18 (5): 279-283.
2. Chen C, Bauske EM, Musson G, Rodriguez-Kabana R, Eloepper JW. Biological control of Fusarium wilts on cotton by use of endophytic bacteria. Biol Control. 1994; 5: 83-91.

3. Frommel MI, Pazos GS, Nowak J. Plant-growth stimulation and biocontrol of tomato seeds with seratia plymuthica and Pseudomonas sp. Fitopotogia. 1991; 26: 65-73.
4. Tianxing L, Longfai Z, Yazhen Y, Qinlan G, Mingfu G. Potential of endophytic bacterial isolated from Sophora alopecuroids nodule in biological control against verticillium wilt disease. Australian Journal Crop Sci. 2013; 7(1): 139-146.
5. Zhao ZZ, Wang QS, Wang KM, Brain KL. Study of the antifungal activity of Bacillus Vallismortis ZZ 185 in vitro and identification of its antifungal compound. Biosource Technol. 2010; 101: 292-297.