

EXECUTIVE SUMMARY

Project Title: Diversity of fungal endophytes of tropical forest trees in Western Ghats

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- For the first time, hosts belonging to five different tropical forests were studied for their foliar fungal endophyte assemblages.
- Fungal endophytes were isolated from hosts belonging to different dicotyledonous families and from different tropical forests in Nilgiri Biosphere Reserve, Western Ghats.
- Fungal endophytes were isolated during both dry and wet seasons to study the effect of precipitation on fungal endophytes.
- Coelomycete members dominated the endophyte assemblage of most of the hosts.
- Precipitation plays an important role in determining the density of endophytes but not the species diversity.
- The number of isolates recovered from most of the hosts increased during the wet season
- Though more individuals were recovered, no new species could be recovered during the wet season.
- The dominant endophyte species were recovered during both dry and wet seasons.

- A nested quadrat method of sampling, using a single leaf, showed that the number of isolates kept on increasing with increased area of sampling, while the number of species that were isolated from the leaf increased initially, but the slope flattened rather early
- Endophyte diversity of hosts growing in a dry tropical forest may not be as hyperdiverse as that of those in a moist tropical forest.
- Individual hosts were endophyte rich, but the diversity of the endophyte community as a whole was not exceptional.
- Studies on endophyte diversity should be carried out at a community level rather than at the level of individuals.
- No host specificity among tropical fungal endophytes could be detected.
- Diversity index of the endophytes was reduced when hosts with higher frequency of occurrence were excluded from the analysis. However, excluding the least abundant hosts did not affect this index.
- The density of host population determined the composition and distribution of endophytes in dry thorn forest.
- Some endophyte genera such as *Phyllosticta*, *Phomopsis* and *Colletotrichum* were isolated from a wide variety of distantly related host plants.
- Genera such as *Phyllosticta* and *Phomopsis* dominated the endophyte assemblage of most of the hosts studied in the present study.
- There were two groups of foliar endophytes in the forests. One group comprised of the ubiquitous forms that invariably dominated the assemblage; while the less frequent and unique forms contributed the other.

- Even though the plant diversity is high in tropical forests, the diversity of their endophytes may not be high in all of them due to the presence of dominant generalists and low frequency of occurrence of host specific forms.
- While studying tropical fungal endophytes, it is suggested to identify the generalists first in order to rapidly calculate the diversity.
- Prediction of global fungal diversity based on studies of a particular geographic area or host assemblage may be erroneous as they may not be representative in nature.
- RFLP analysis of a dominant endophyte (*Phyllosticta sp.*) showed no variation among the isolates obtained from different tree hosts indicating that all the isolates belonged to the same species. This again indicated the absence of host specificity.
- Comparison of the sequence with the other published ITS sequences available in the GenBank database showed that this fungus was similar to the isolates of *G. endophyllicola* and *P. capitalensis*.
- The results of our study provided evidence for the fact that *P. capitalensis* is a universal foliar endophyte of tree hosts.
- It was suggested that ubiquitous coelomycete genera should be investigated using molecular techniques to get a clear understanding of the fungal diversity in the tropics.
- For the first time, melanin pigment of an endophyte was studied.
- *Phyllosticta capitalensis* produced a dark coloured pigment, which was identified to be a DHN type of melanin based on physical and chemical tests.
- Since melanization provides the fungus with added advantages, it was suggested that this may be one of the reasons for the widespread nature of this endophyte.

- Bark fungi were distinct from foliar endophytes.
- The diversity of bark fungi also increased during the wet season.
- All the endophytes screened produced some extracellular enzymes.
- All the endophytes tested showed lipolytic activity.
- Some endophytes were able to overgrow common plant pathogens
- When endophytes were challenged with fungal pathogens, most of them showed mutual stasis.
- Some endophytes were able to influence rice seed germination and plant cell division.