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# Studies on Antagonism Among Epiphytes Isolated from Leaf Surfaces

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Antagonism as one of the causes for differential populations of resident fungi on phylloplane was studied through interaction by dual agar culture method taking some dominant and sub-dominant fungal members The dominant fungi were *Curvularia lunata, C. pallescens* and *Penicillium granulatum* and the sub-dominants were *P. oxalicum, Aspergillus niger* and *A. awamori*. Dominant fungi were more affected in culture plates than sub-dominat ones, when interacted with each other. Higher populations of individual fungi on phylloplane depended more on their sapraphytic competetive ability than antagonism.

**Key words** : Antagonism, Epiphytes, Leaf surfaces, Inhibition, Aversion, Dominant, Resident

## INTRODUCTION

Ecological niche of leaf surfaces supports to a variety of resident fungi that occur at different abundances depending upon their response to existing biotic and abiotic factors. Antagonism is one of the major biotic factors to regulate populations among the epiphytes on phylloplane ( Leben, 1965 ; Sharma, 1985 ; Sinha, 1965 ). Among resident some are highly expressed, some moderately expressed and some are poorly expressed. The present paper discusses the antogonistic relationship among the three categories of epiphytes through interaction studies.

## MATERIALS AND METHODS

Certain epiphytes viz. *Curvularia lunata, C. pallescens, Penicillium oxalicum, P. granulatum, Aspergillus niger* and *A. awamari* were isolated and pure cultured

on PDA medium. Interaction among the fungi was studied in-vitro by dual culture method ( Sharma *et al.*, 1988 ). Inoculum discs of 5 mm diameter, cut from actively growing edges of seven-day old cultures, were placed on agar medium at 3 cm apart and incubated in culture room maintained at 25±3°C. Growth of the colony was measured to either sides radially to determine the percentage rate of inhibition, type of interaction and distance of inhibition zone after an interval of 15 days when the fungus reached a plateau. Percentage inhibition was found out as $r_1—r_2/r_1 \times 100$, where $r_1$ and $r_2$ are the radii of two interacting colonies ( Fokkema, 1973 ). The results are based on the average of three replicates.

## RESULTS AND DISCUSSION

Percentage inhibition in radial growth and the inhibition zones between the interacting fungi are given in Fig. 1 and Table 1 respectively. *Curvularia lunata*, *C. pallescens* and *Penicillium granulatum* were isolated at moderate to high populations ( 60—80% frequency ) while *P. oxalicum*, *Aspergillus niger* and *A. awamari* were isolated at low to moderate frequency ( 30—60% frequency ). It is evident from the Fig. 1 that *C. lunata*, *C. pallescens* and *P. granulatum* were more affected in growth compared to other three members. The least

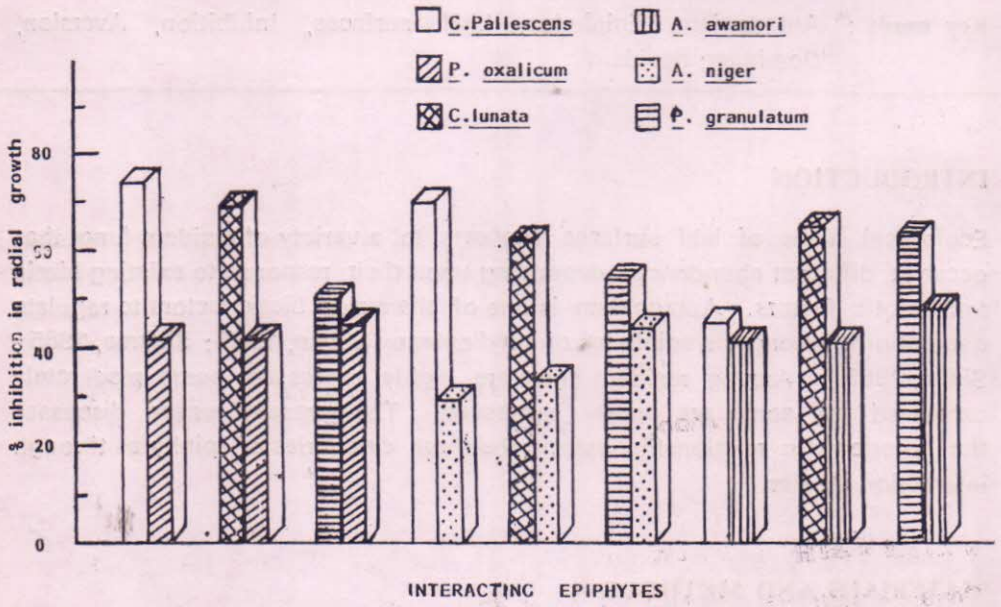


Fig 1. Variation in the percentage inhibition of radial growth of epiphytes studied on agar plates

affected one was the *A. niger* followed by *A. awamari* and *P. oxalicum*. The zone of inhibition ( Table 1 ) clearly indicates the type of interactions that was not identical with all the fungi. According to Skidmore and Dickinson (1976) the interaction between *C. lunata* with *P. oxalicum* and *A. awamori*, *C. pallescens*

**Table 1.** Inhibition of growth of epiphytes studied on agar disc method

| Epiphytes | Inhibition zone (mm)* | | |
|---|---|---|---|
| | *P. oxalicum* | *A. niger* | *A. awamori* |
| *C. pallescens* | 3.0 | 4.5 | 1.5 |
| *C. lunata* | 3.5 | 1.0 | 3.0 |
| *P. granulatum* | 1.0 | 2.5 | 3.0 |

* Average of 3 replicates

with *P. oxalicum* and *A. niger* and *P. granulatum* with *A. awamori* can be said as aversion type and in other cases the growth check was almost at a line of contact. Although antagonism is one of the biotic factors regulating populations on phylloplane ( Fokkema, 1981 and Melgarejo *et al.*, 1985 ) the highly expressed ones are not necessarilly affected by the process as saprophytic competative ability of individuals vary depending upon the leaf surface niche that supports their populations.

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## REFERENCES

Fokkema, N. J. (1973). The role of saprophytic fungi in antagonism against *Drechslera sorokiniana (Helminthosporium sativum)* on agar plates and on rye leaves with pollen. Physiol, Pl. Pathol. 3 : 195-205.

Fokkema, N. J. (1981). Fungal leaf saprophytes, beneficial or detrimental ? In : J. P. Blackeman (ed) Microbial Ecology of the Phylloplane, pp. 433-454, London : Academic Press.

Leben, C. (1965). Epiphytic microorganisms in relation to plant-disease. Ann Rev Phyto Pathol 3 : 209-230.

Melgarejo, P., Carrillo, R. and Sagasta, E. M. (1985). Mycoflora of peach twigs and flowers and its possible significance in biological control of *Monilinia laxa*. Trans. Br. Mycol. Soc. **85**(2) : 313-317.

Sharma, P. D. (1985). Potential of phylloplane microorganisms for biological control of rust diseases. Front Appl Microbiol **1** : 201-236.

Sharma, P. D., Sainger, D. K., Niwas, S. (1988). Antagonism between phylloplane fungi and *Alternaria solani* on agar plates. Acta Botanica Indica **16** : 236-238.

Sinha, S. (1965). Microbiological complex of the phyllosphere & disease control. Indian Phytopathol. **18** : 1-20.

Skidmore, A. M. and Dickinson, C. H. (1976). Colony interactions and hyphal interference between *Septoria nodorum* and phylloplane fungi. Trans. Br. Mycol Soc. **66** : 57-64.

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