

Usefulness of epiphytic microflora from pod surface on the management of *Phytophthora* pod rot of cocoa

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SUMMARY

Phytophthora pod rot (PPR) of cocoa incited by *Phytophthora palmivora* is a serious disease inflicting heavy crop losses. Hence, this study was undertaken to harness the potential of epiphytic microflora from cocoa pods for the management of this important disease. The total epiphytic microflora from pods collected from different locations of Thrissur district was quantitatively estimated by serial dilution plate technique. Population of bacteria was more than that of fungi and actinomycetes. *In vitro* screening of 16 fungi, 22 bacteria, five actinomycetes and two fluorescent pseudomonads from pod surface against *P. palmivora* was carried out along with the standard cultures of *Trichoderma harzianum* and *Pseudomonas fluorescens*. All the isolates of fungi and bacteria tested were antagonistic to *P. palmivora* in varying degrees. Based on the *in vitro* evaluation, promising seven epiphytic fungi and five epiphytic bacteria were selected to test their efficiency in reducing infection by *P. palmivora* on detached pods. Among them, an epiphytic isolate of *T. viride* and two isolates of *P. fluorescens* were more effective in reducing the disease on uninjured pods. But on the injured pods, only the isolate of *P. fluorescens* (23B) showed more than 40 per cent efficiency. Field evaluation of the efficient epiphytes in comparison with standard cultures of *T. harzianum* and *P. fluorescens* and recommended fungicides showed that fluorescent pseudomonads were more promising in reducing the infection. Their efficiency was comparable with that of fungicides.

Key words : Cocoa, *Phytophthora palmivora*, *Trichoderma* spp., *Pseudomonas fluorescens*.

Cocoa (*Theobroma cacao* L.) is an important beverage crop grown extensively as a mixed crop in arecanut and coconut gardens of southern states of India. One of the important constraints in the production of this crop during rainy season is the pod rot caused by *Phytophthora palmivora*. Though, chemical fungicides like Bordeaux mixture is found to give satisfactory control of this disease, extensive use of these fungicides may pose many ecological problems. In order to overcome this problem, many workers attempted to manage the disease with microbes present on the pod surface. Galindo (1992) isolated antagonistic epiphytic *Trichoderma harzianum* and *Pseudomonas fluorescens* from cocoa pods and reported their efficacy in reducing PPR infection. Dennis *et al.* (1995) and Sharifuddin (2000) isolated many bacteria from cocoa pod surface and demonstrated their potential antagonistic effect against PPR pathogen. Usefulness of native fungal antagonists like *Trichoderma* spp. and *Gliocladium roseum* isolated from cocoa pods against *P. palmivora* of cocoa was also reported by Krauss *et al.* (1998) and Hoopen *et al.* (2003). Further, Konam (1999) had pointed out the use of natural antagonists as a component in the integrated management of PPR of cocoa. In view of the above facts and the serious nature

of this disease, the present investigation was undertaken to harness the potential of epiphytic microbes present on the surface of cocoa pods on the management of PPR of cocoa.

MATERIALS AND METHODS

I. Isolation of epiphytic microflora

The healthy pods available in severely infected cocoa gardens were collected during rainy periods from four different locations of Thrissur district of Kerala. Then the pod husk was cut (3 mm deep) into pieces of 2.5 cm² size and 10 such pieces were placed in 100ml sterile water. The contents were shaken for 30 min in a rotary shaker. The total epiphytic microflora were isolated by serial dilution plate technique using potato dextrose agar, nutrient agar and Kaster's agar for fungi, bacteria and actinomycetes respectively.

II. *In vitro* screening of epiphytic microflora against the pathogen

The epiphytic isolates of 16 fungi, 22 bacteria including two fluorescent pseudomonads, five actinomycetes and standard cultures of *T. harzianum* and *P. fluorescens* were tested for their antagonistic action

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