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Characterization of *Fusarium oxysporum* Causes Foot Rots of *Capsicum annum* L. of Sri Lanka and Its Control with the Use of Endophytic Fungi

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Abstract

One of the major diseases of *Capsicum annum* L. focused on in this study is fungal foot rot which is caused by *Fusarium oxysporum*. Because of adverse effects of chemical fungicides, biological management of diseases is suggested for sustainable food production. Within the study, the ability to suppress disease by endophytic fungi was tested with the aim of evaluating the efficacy of endophytic fungi as potential bio-control agents against referred disease. Throughout the methodology, standard procedures were used. Isolation and identification of *Fusarium oxysporum* were done in different places in Kandy. All samples were washed using running tap water, and about 1cm^2 sections, including the edges of lesions, were cut, surface sterilized, placed on Potato Dextrose Agar (PDA), and incubated at room temperature until colonies appeared. Fungal colonies that emerged from lesions were sub-cultured onto fresh PDA, and pure cultures were prepared. The pathogenicity of the isolated pathogen was confirmed via standard Koch's Postulate. *Fusarium* isolates were identified morphologically, and species-level identification was done by extracting genomic DNA and amplifying and sequencing ITS-1 and ITS-4 regions. Endophyte isolation was done similarly to the above procedure of pathogen isolation from roots and aerial parts of the healthy Capsicum plants. After screening endophytic fungi, the antagonistic effect against *Fusarium oxysporum* was tested with dual plate assay. With the aid of morphological and molecular characteristics, the foot rot pathogen was confirmed and identified as *Fusarium oxysporum.* As a result of endophyte isolation; five different endophytic fungi were isolated (*Talaromyces* sp, *Purpureocillium* sp, *Trichoderma* sp, *Eupenicillium* sp, and *Trichoderma* sp). According to the results of the dual plate assay and Tukey's pairwise comparison of five different assays with three replicates, *Purpureocillium lilacinum*. (49.4067%), *Talaromyces purpureogenus* (2883120) (62.9409%), *Trichoderma* spp. 1 (58.9422%), *Eupenicillium* spp. (62.7285%) and *Trichoderma* spp. 2 (63.043%) showed significantly high ($p \leq 0.05$) inhibition of *Fusarium oxysporum* colony growth. Microscopic observations of inhibition zones between *Fusarium oxysporum* and effective endophytic fungal colonies showed the presence of haustoria, coils, loops, and knobs, as mycoparasitic structures indicating their potential as biocontrol agents. According to the results, it could be concluded that all tested Endophytic fungi species (*Talaromyces* sp, *Purpureocillium* sp, *Trichoderma* sp 1, *Eupenicillium* sp, and *Trichoderma* sp2) can control the *Fusarium oxysporum* in an *in* vitro condition. Current study can go forward with further studies such as application method studies, field trials and develop a bio-control fungicide.

Keywords: *Endophytic microflora, Fungal foot rot, Fusarium oxysporum, Sri Lanka*