

Research Article

Impact of *Trichoderma* Species on Myceliogenic and Sclerotial Behaviour of *Sclerotinia sclerotiorum* Causing White Mold of Common Bean

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Abstract

White mold caused by *Sclerotinia sclerotiorum* is a major soil borne disease causing significant losses to the bean production. The pathogen perpetuates in the form of sclerotia as well as through seeds and initiates the disease in the ensuing cropping season. The disease appears at different plant stages, right from the seedling to pod maturation stage. Rising concern about having healthy pesticide free food has invited the attention of farms scientists to look for other alternative strategies like biological control and use of resistant cultivars. Keeping in view the demands of growing world for pesticide free food, six native *Trichoderma* strains were tested for their efficacy against white mold pathogen. Out of these, *T. koningii* (DMA-8) performed best in dual culture test and in its non-volatile compounds assay. While in the study of volatile metabolites, *T. harzianum* (TH-4) was good and sclerotia treated with *T. viride* had shown significant reduction in sclerotial germination. Under greenhouse conditions, seed coating and bio-priming with *T. koningii* (DMA-8) and soil application of *T. koningii* strains (DMA-8 & JMA-11) were more effective than other treatments in minimizing the damping-off. The application of bio-agents seven days prior to pathogen application in soil was best in controlling damping off as compared to other methods.

Key words: Bio-agents, common bean, metabolites, seed bio-priming, *Trichoderma* and white mold

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Common bean a premier legume crop cultivated worldwide, is consumed by a large population both as pulse (Kidney bean) and vegetable (French bean) (Vidyakar et al 2017). This crop is rich in proteins, micronutrients primarily iron (70 mg kg⁻¹) and zinc (33 mg kg⁻¹), dietary fibres along with vitamins especially vitamin A and unsaturated fatty acids (Celmeli et al 2018). Its production is being affected by many foliar and soil borne diseases caused by fungal, bacterial and viral pathogens, of these white mold caused by *Sclerotinia sclerotiorum* (Lib) De Bary is a major soil borne disease. This disease is reported to cause significant yield losses, sometimes upto 100 per cent in susceptible cultivars under congenial environments (Purdy 1979; Abawi and Grogan 1979; Perveen et al 2010; Vasconcellos et al 2017). It is basically a homothallic fungus which forms long-lived

melanized structures called sclerotia for survival (Bolton et al 2006; Sexton et al 2006; Chitrampalam et al 2013; Kamvar et al 2017; Smolinska and Kowalska 2018). In addition to longevity, sclerotia produce ascospores which are primary disease accuser. The infected seeds generally fail to germinate in soil due to the presence of dormant mycelium in testa & cotyledons, and plays role in dissemination & epidemiology of disease (Tu JC 1988). The disease involves primarily three distinct phases viz., opportunistic-saprophytic, pathogenic and a second saprophytic phase. The long survival of the pathogen in soil as sclerotia makes the management of this disease inconsistent and uneconomical. The use of fungicide is one of the prime management practice for this disease but their indiscriminate use has posed threat to environment and non-target