SCREENING OF BACTERIA FOR BIOLOGICAL CONTROL OF BROWN PATCH AND PYTHIUM BLIGHT DISEASES OF TURFGRASS

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Introduction

Brown patch disease and Pythium blight disease caused by *Rhizoctonia solani and Pythium aphanidermatum,* respectively, are the two major soil-bome turfgrass diseases occurring world-wide. Currently the most widely used control measure is fungicidal treatment on infected turfgrasses. However, the frequent and prolonged use of fungicides have become problematic due to adverse effect on non-target organisms as well as creating fungicide resistant population of the pathogen. Biological control is an alternative and potentially attractive strategy of reducing fungicide input to highly managed turfgrasses. This study was therefore conducted to determine the biological control potential of bacterial isolates obtained from turfgrass grown areas against brown patch and *Pythium* blight diseases of turfgrasses.

Materials and Methods

Bacterial isolates were obtained from thatch and soil of *Cynodon dactylon* cv. Tifdwarf, taken from greens, fairways and tees, by removing 10-cm diameter cores from symptomatic areas to a depth of 6 - 10 cm with the aid of a cup cutter. Bacterial isolates were screened for their ability to suppress the growth of *R. solani and P. aphanidertnatum.* The dual-culture technique was used where 5-mm mycelia plug obtained from the leading edge of a 5-day old culture of each fungal pathogen was taken and placed at the centre of the plate. Individual bacterial isolate was then streaked at 4 opposite locations 2.5 cm from the mycelial plug. PDA was used in this study since both microorganisms can grow well on this medium. The radial growth of inhibition fungus was measured daily. Bacterial isolates showing antagonistic activity were identified using the Biolog Identification System (Biolog Inc., Hayward California) while *R solani and P. aphanidermatum* were identified based on their morphological characteristics.

Results and Discussion

Isolation of bacteria from thatch and soil of C *dactylon* cv. tifdwarf resulted in total bacterial count ranging from 0.97 - 2.5 x 103 cfu/g of sample, which can be grouped into 10 different colony types. Out of the 10 colony types, only five isolates were found to have antagonistic activity against *R. solani* and /or *P. aphanidermatum* when tested using the dual culture techniques. All of these bacteria were isolated from the thatch. The bacterial isolates were identified as *Bacillus megaterium, Burkholderia cepacia, Chromobacterium violaceum, Pseudomonas aeruginosa and Serratia marcescens. B. megaterium, B. cepacia and P aeruginosa* were found to inhibit the growth of both R. *solani and P. aphanidennatum while S. marcescens* and C *violaceum* were found to inhibit the growth of only *P. aphanidermatum.* However, when the radial growth of both pathogens was compared, it was noted that the growth inhibition of *P. aphanidematum by B. cepacia and P. aeruginosa* was lower than the growth inhibition of *R. solani. B. megaterium* had been reported to be a potential biological control agent against R. *solani* on soybeans as well as *Phomopsis* sp., *Pestalotia* sp. and *Alternaria alternata* on Litchi (Korsten et al 1993). Optimisation studies done by Korstan on the postharvest pathogens revealed that the postharvest decay was more effectively reduced with *B. megaterium* applied as a fine spray compared with dip application. Even though *B. cepacia (Pseudomonas cepacia)* is the causal agent of the onion sour skin disease, it had been reported to inhibit the growth of many fungal pathogens including *Sclerotium rolfsii and Fusarium oxysporum* f. sp. *raphani* (Sanchez et al, 1994). It has also been reported to be a good biological control agent against *Rhizoctonia* stem rot disease of *Euphorbia pulcherima* caused by *R. solani* (Cartwright and Benson, 1995). *P. aeruginosa* had been reported to be able to reduce the infection of *R. solani* and *Macrophomina phaseolina* on chickpeas. This bacterium inhibited the growth of the pathogen through the production of salicylic acid and siderophores production. *S. marcescens* had been reported to be antagonistic to *Phytophthora capsici* in vitro, able to reduce damping off of cultivated cucumber seedling and suppressed summer patch symptom development on *Poa pratensis* caused by *Magnaporthe poae* (Kobashi et al. 1995).

Conclusions

Five isolates were found to have antagonistic activity against *R. solani* and /or *P. aphanidermatum.* All of these bacteria were isolated from the thatch. The bacterial isolates were identified as *Bacillus megaterium, Burkholderia cepacia, Chromobacterium violaceum, Pseudomonas aeruginosa and Serratia marcescens. B. megaterium, B. cepacia and P aeruginosa* were found to inhibit the growth of both R. *solani and P. aphanidennatum while S. marcescens* and C *violaceum* were found to inhibit the growth of only *P. aphanidermatum.*

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