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Bio-control Potential of Rice (*Oryza sativa* L.) Endophytes against Major Rice Pathogens

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Abstract

Rice is attacked by many pathogens which can greatly reduce the yield. Modern agriculture now mainly depends on use of agrochemicals to struggle with diseases. However, use of certain agrochemicals has been closely associated with environmental and ecological hazards such as loss of biodiversity, increased environmental pollution and negative impacts on human and animal health. Use of bio-control agents is one of the best strategies available to manage the diseases in an ecofriendly manner. Biological control of plant pathogens using endophytic fungi is another strategy in sustainable disease management. At present, there is a need for searching alternative options to control plant diseases in Sri Lanka as the country is now moving to organic agriculture. Therefore, this study aims to isolate endophytes from rice leaves and to investigate their potential to control major rice pathogens as safe alternatives to chemical fungicides. The experiment was carried out in the plant pathology laboratory, Regional Rice Research and Development Center, Bombuwela (RRRDC, BW). Rice leaves were collected from varieties Bw 367 and Bw 455 in the research field at RRRDC, BW to isolate endophytes. Twenty one fungal endophytes were isolated on Potato Dextrose Agar (PDA) medium. Rice pathogens isolated as endophytes were discarded and four isolates were selected to evaluate the antagonism in dual culture test on PDA medium *in vitro*. Endophytes were tested against rice pathogens *viz.* *Bipolaris oryzae*, *Pyricularia oryzae*, *Alternaria padwickii*, *Fusarium moniliforme* and *Curvularia lunata*. The experiment was placed in Completely Randomized Design with 4 replicates. Colony diameter of test pathogens was measured five days after incubation. Inhibition percentage was calculated based on colony diameter of the pathogen. Data were analysed statistically using SAS (Statistical Analysis System) version 9.1.3. ANOVA (Analysis of Variance) method was done to analyze the data and means were compared by DMRT (Duncan's Multiple Range Test). According to the results, all the tested endophytic isolates significantly inhibited the growth of all the pathogens except *F. moniliforme*. However, I-4 isolate was found as the best for inhibition of all the pathogens. Further, I-4 suppressed more than 50.00% of the growth of *B. oryzae* (52.25%) and *C. lunata* (55.55%) while *P. oryzae* by 44.77%, *F. moniliforme* by 39.28% and *A. padwickii* by 33.27%. It was observed that I-4 was overgrown all the pathogens completely after 7 days of inoculation. Above results revealed that I-4 has the potential to use as a bio-control agent in rice disease management. Future studies are needed to identification of I-4 and evaluate its effectiveness in the field level.

Keywords: Bio-control, Endophytes, Pathogens