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Indole Acetic acid production and pathogen growth control abilities of endophytic fungal assemblages associated with two newly improved *Oryza sativa* varieties of Sri Lanka

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Newly improved rice varieties, highly dependent on agrochemicals, have been introduced to meet the increasing food demand in Sri Lanka. Health and environmental problems caused by extensive use of agrochemicals in rice cultivation necessitate investigations on alternative, less harmful methods for maintaining high productivity and disease management. Endophytic fungi (EF) of many crops have been reported to have the ability to enhance plant growth through the synthesis of Indole Acetic Acid (IAA) and to possess mechanisms of fungal pathogen control. Therefore, the present study was carried out to assess the levels of IAA production by the endophytic fungi (EF) isolated from two rice varieties, At 362 and Bg 352 with a view to utilise the high producers of IAA as a means of increasing rice plant growth and productivity. Screening test for growth inhibition of two known rice pathogens, *Rhizoctonia solani* and *Bipolaris oryzae*, the causative agents of Sheath blight and Brown spot diseases respectively was carried out to test the possibility of using isolated EF for management of the two pathogens. Healthy plant samples of the selected rice varieties were collected during the Yala and Maha seasons (2019) from Anuradhapura, Kurunegala, Gampaha and Kalutara districts. Endophytic fungi present on leaves, stems and roots were isolated onto 2% Malt Extract Agar medium. Fungal isolates were identified based on morphological characters and ITS gene sequencing. A total of 235 EF isolates belonging to 26 genera were isolated from the two rice varieties. IAA production by these fungal isolates was evaluated using Salkowski's assay. The effect of the isolated EF on the growth of the two fungal pathogens was tested under *in-vitro* conditions using the dual culture assay. All experiments were conducted in triplicate and data were statistically analysed using one-way ANOVA and Tukey's pairwise comparisons. Amongst the tested isolates, *Curvularia* sp and *Aspergillus terreus* isolated from Bg 352 produced IAA at significantly high levels of 15.642 µg/mL and 15.117 µg/mL respectively ($P < 0.05$). Dual culture studies showed that *Sarocladium oryzae* and *Rhizopus microsporus* isolated from At 362 inhibited the colony growth of *R. solani* by 68.5% and 58.7% respectively whilst the growth inhibition of *B. oryzae* was 38.5% and 43.1% respectively. The preliminary tests of this study indicated that some of the EF associated with the two rice varieties have the ability to produce significantly high levels of the growth promoting phytohormone IAA whilst some others have the means to control the growth of two common rice pathogens and therefore have the potential to be used for increased productivity of rice as well as for the control of the two rice diseases after further testing.

Keywords: Endophytes, Rice, Growth-enhancement, Rice-pathogens, Bio-control

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