

Endophytic fungi as growth promoters of rice (variety *Ld 368*)

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Chemical fertilizers and pesticides are widely used in agriculture for increased growth and production of plants and for disease management in Sri Lanka. Long term use of these chemicals can cause hazardous effects on the environment and to human health. Use of environmentally friendly microorganisms such as endophytes to promote plant growth is an alternative and a promising approach. Endophytic fungi that live naturally within plant parts are reported to have the ability to enhance their host's growth. Therefore, this study was carried out to investigate the endophytic fungal communities associated with the rice variety *Ld 368* and to examine their effect on rice plant growth.

Root, stem, leaf, seeds and seedlings of healthy *Ld 368* plants were used for the isolation of fungal endophytes. Most common and frequently isolated endophytes from all plant parts were used to determine their effect on rice plant growth under greenhouse conditions by inoculating each isolate into healthy *Ld 368* seedlings using seedling inoculation method and soil inoculation method. There were 3 replicates for each method and spore suspensions (1×10^5 spores/ml) were used for the soil inoculation. Fresh weight, dry weight and shoot length of 5 plants, randomly selected from each treatment were measured at 1 week intervals. Mean values of measurements were statistically analyzed using one-way and two-way ANOVA and Tukey's pair wise test (Minitab 17).

Thirty-one different endophytic fungal species were isolated from healthy *Ld 368* plants and the overall colonization rate of endophytes in healthy *Ld 368* variety was found to be 58.7%. Most common and frequently isolated endophytes were *Trichoderma* sp. 1, *Trichoderma* sp. 2 and *Chaetomium* sp. Plants inoculated with these 3 endophytes showed a significant difference ($P \leq 0.05$) in all growth parameters evaluated (shoot length, fresh weight and dry weight) as compared to control plants during a 4 week period under greenhouse conditions. Plants inoculated with *Trichoderma* sp. 1 and *Chaetomium* sp. showed the highest increase in plant height ($21.90 \text{ cm} \pm 0.58$, $18.68 \text{ cm} \pm 0.83$), fresh weight ($0.147 \text{ g} \pm 0.002$, $0.133 \text{ g} \pm 0.007$) and dry weight ($0.019 \text{ g} \pm 0.001$, $0.014 \text{ g} \pm 0.001$) respectively when compared to those inoculated with *Trichoderma* sp. 2 ($14.90 \text{ cm} \pm 0.55$, $0.106 \text{ g} \pm 0.008$, $0.009 \text{ g} \pm 0.001$) and control ($13.10 \text{ cm} \pm 0.29$, $0.088 \text{ g} \pm 0.007$, $0.007 \text{ g} \pm 0.001$), indicating that an inoculum consisting of the two fungal endophytes could be developed to enhance the growth of rice variety *Ld 368*.

Keywords: Endophytes, Growth enhancement, *Ld 368* rice variety