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Increasing Rice Plant Growth by *Trichoderma* sp.

Febri Doni[1, a)], Anizan Isahak[2, b)], Che Radziah Che Mohd Zain[1, c)], Norela Sulaiman[2, d)], F Fathurahman[1, 3 e)], Wan Nur Syazana Wan Mohd. Zain[2, f)], Ahsan A. Kadhimi[1, g)], Arshad Naji Alhasnawi[1, h)], Azwir Anhar[4, i)] and Wan Mohtar Wan Yusoff[1, j)]

[1]*School of Biosciences and Biotechnology, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600, Bangi, Selangor Malaysia*
[2]*School of Enviromental Sciences and Natural Resources, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600, Bangi, Selangor Malaysia*
[3]*Department of Agrotechnology, Faculty of Agriculture, Universitas Islam Riau, Indonesia*
[4]*Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang, Indonesia*

[a)] doni@siswa.ukm.edu.my
[b)] anizan@ukm.edu.my
[c)] Corresponding author: cradziah@ukm.edu.my
[d)] vozela@ukm.edu.my
[e)] fathur@siswa.ukm.edu.my
[f)] syazanawanza@gmail.com
[g)] kkkihsan@yahoo.com
[h)] arshadnhiq@gmail.com
[i)] azwirbio@fmipa.unp.ac.id
[j)] wantar @ukm.edu.my

Abstract. *Trichoderma* sp. is a plant growth promoting fungi in many crops. Initial observation on the ability to enhance rice germination and vigor have been reported. In this study, the effectiveness of a local isolate *Trichoderma asprellum* SL2 to enhance rice seedling growth was assessed experimentally under greenhouse condition using a completely randomized design. Results showed that inoculation of rice plants with *Trichoderma asprellum* SL2 significantly increase rice plants height, root length, wet weight, leaf number and biomass compared to untreated rice plants (control). The result of this study can serve as a reference for further work on the application of beneficial microorganisms to enhance rice production.

INTRODUCTION

Soil microbes are important components of biogeochemical cycles and crop production. Plant health and soil fertility are indirectly related to microbial population and health. Beneficial free-living soil fungi, usually referred to as plant growth promoting fungi (PGPF), are capable of promoting plant growth by colonizing plant roots. PGPR are also termed plant health promoting fungi (PHPF) as their presence is crucial to healthy soil ecological environment [1].

Trichoderma spp. have been long known for their biocontrol activities and crop growth promoters. *Trichoderma* is characterized by rapid growth, mostly bright green conidia and a repetitively branched conidiophore structure. As opportunistic plant symbionts and effective mycoparasites, numerous species of this genus have the potential to become commercial biofungicides [1, 2]. *Trichoderma* spp. have the ability to promote plant growth, increase plant height, leaf area and dry weight. To date, there is little information on the ability of *Trichoderma* spp. to promote

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rice seedling growth. This research was carried out to examine the effect of *Trichoderma asprellum* SL2 on rice seedling growth.

MATERIALS AND METHODS

A completely randomized design was used for this experiment. The treatment was rice seedlings inoculated with *T. asprellum* SL2 and rice seedlings without any treatment were used as a control. Treatment and control were replicated 15 times. A local isolate *T. asprellum* SL2 was obtained from the Fermentation Technology Laboratory, School of Biosciences and Biotechnology, Faculty of Science and Technology, Universiti Kebangsaan Malaysia. *Trichoderma asprellum* SL2 was grown in potato dextrose agar and incubated for seven days at 30°C. After incubation, spores of the *T. asprellum* SL2 were immediately transferred to an Erlenmeyer flasks containing sterilized water. Rice seeds of the variety MRQ74 were surface sterilized and grown in autoclaved lateritic soil under greenhouse condition with ambient temperatures of 26 – 34°C, and placed in a seedling tray. Ten five-day-old rice seedlings were selected then soaked in the *T. asprellum* SL2 spore suspension in a flask containing 10^7 spores/ml spore suspension for 30 minutes. Ten rice plants soaked in distilled water served as control. Rice plants were grown singly in 15 × 15 cm plastic containing autoclaved lateritic soil. Water was maintained at 1 cm level from the soil surface and actively aerated by physically breaking up the soil surface once every ten days.

Rice seedling growth components were measured after 15 days after transplanting. Plant height (cm) was measured from ground level to the tip of the longest leaf and leaf number was counted for each treatment and control. Root length (cm) was measured from the base of the stem to the longest root using a ruler and rice seedling wet weight (g) was measured using a digital scale. Rice biomass (g) measurement was done after the rice roots were dried in the oven at a temperature of 65° C for seven days. All data were analyzed statistically using One-way analysis of variance (ANOVA) methods. Mean separation was carried out for significantly different parameters using LSD test at $p<0.05$.

RESULTS AND DISCUSSION

Table 1 shows the effect of *T. asprellum* SL2 on the rice seedling growth parameters. In general, all the parameters increased significantly ($p <0.05$) when treated with *Trichoderma asprellum* compared to control (without *Trichoderma asprellum* SL2 inoculation).

TABLE 1. Effect of *Trichoderma asprellum* SL2 on Rice Seedling Growth

Treatment	Height (cm)	Root length (cm)	Wet Weight (g)	Leaf number	Biomass (g)
Trichoderma asprellum SL2	30.80[a]	15.40[a]	1.83[a]	6.10[a]	0.54[a]
Control	25[b]	8.90[b]	0.89[b]	1.50[b]	0.37[b]

[a, b]: Means with the same letters within the column do not differ significantly according to LSD ($p<0.05$)

The ability of *Trichoderma* spp. to produce phytohormones is the key factor in the increase in rice plant height as reported by Chowdappa et al. [3]. *Trichoderma asprellum* SL2 applied to rice plants is also reported to be able to increase rice root length compared to control. The enhancement of leaf number by *T. asprellum* SL2 was made possible because of the ability of the *T. asprellum* SL2 to act through several mechanisms such as environmental buffering (against pH, drought, waterlogging, cold and heat), P solubilization and siderophore production [4]. The fresh weight and biomass of rice plants treated with *T. asprellum* SL2 were significantly greater than control. The ability of *Trichoderma* spp. to produce growth hormones such as auxins and gibberelins were reported as the main factor that contributes to the enhancement of plant growth by *Trichoderma* sp. [5, 6, 7].

CONCLUSION

The present study concludes that *T. asprellum* SL2 significantly enhance rice seedling growth.

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