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Valorization of diaper waste into sustainable production of commercially grown *Pleurotus* spp. in Sri Lanka

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Oyster mushrooms (*Pleurotus* spp.) are commercially grown and consumed for their taste, high nutritional value, and medicinal properties. In Sri Lanka, oyster mushroom cultivation is practiced on a small scale as a self-employment cottage industry. With the scarcity as well as increased cost of conventional substrate materials, the use of an efficient, cost-effective, and sustainable alternative substrate is a key factor in promoting the oyster mushroom industry within the country. Disposable diapers representing about 4% of solid waste, which is the third largest consumer item discarded after a single use, pose a great burden on landfill sites causing adverse impacts on the environment. Therefore, this study aimed to develop a sustainable cultivation protocol using diaper waste to effectively cultivate oyster mushrooms. For this purpose, sterilized diaper cores (1%, 2%, 4%, and 6%) containing liquid waste, were mixed with commercial growth substrate. The treatments were statistically analyzed using One-way ANOVA for their mycelium running rate at 10 days intervals until complete colonization of the substrate blocks and the total yield of mushrooms for a duration of 2 months from the first fruiting date of the four commercially cultivated oyster mushroom species in Sri Lanka; *Pleurotus djamor*, *Pleurotus eous*, *Pleurotus ostreatus*, and *Pleurotus cystidiosus* in comparison with the control treatment containing 100% commercial growth substrate. According to the statistical analysis, the mycelium spreading rate of all the treatments with diaper core incorporation was comparatively higher than the control in *P. ostreatus*, *P. djamor*, and *P. eous* except for *P. cystidiosus*, in which 1% diaper core incorporation was reported the lowest mycelium spreading rate. In all four *Pleurotus* species, 2% and 4% diaper core incorporation led to the fastest running rate and was significantly higher than the control treatments and other treatments. According to statistical analysis, the means of the total yield of treatments and control of the four *Pleurotus* species were not significantly different. However the highest production yield was obtained from 4% of diaper core incorporation for *P. ostreatus* (990 g), *P. eous*, (855 g) and *P. cystidiosus* (820 g) except for *P. djamor* (670 g) for which the highest yield was observed at 2 % diaper core incorporation. With the results obtained, we could confirm that the high lignocellulose content, high N, P, and K content as well as the water retention abilities of used diaper cores suggest a potential for mushroom cultivation through lignocellulose enzymatic reactions. Therefore, our study proposed a potential resource management towards the zero-waste concepts, where diaper waste is no longer a debit entry but a valuable resource for today's circular economy that can be used as a cultivation medium for sustainable mushroom cultivation.

Keywords: Mycelium running rate, Oyster mushrooms, Total yield, Used diapers

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