

Exploring feasibility of cultivating edible mushroom using cotton textile waste: A sustainable approach

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All over the world, a large quantity of cotton textile waste is generated annually. The study was conducted to find a sustainable way to upcycle cotton textile waste while enhancing food production and supporting circular economy. *Pleurotus ostreatus* (oyster mushrooms) were grown by mixing black and white cotton textile wastes in the ratios of 25%, 50%, 75% and 100% with saw dust, and the control substrate was also tested for efficiency of producing mushroom harvest. The data of three flushes were recorded to assess the efficiency of each treatment and the study found that oyster mushroom can grow effectively on cotton waste with varying performances. The highest total quantity of yield and economic yield were obtained in 25% - 50% white cotton substrate. The nine treatments showed differences from each other ($p < 0.05$). The study also determined the concentrations of heavy metals Cu, Cr, Pb and Cd in the oyster mushrooms after dry acid digestion. The concentrations of heavy metals ranged from 0.08 – 0.20 mg/kg for Cu, 0.01 – 0.09 mg/kg for Cr, 0.01 – 0.13 mg/kg for Pb and 0.05 – 0.13 mg/kg for Cd. All resulted concentrations were under the recommended limits set by WHO/FAO. The estimated daily intake values were calculated and compared with tolerable daily intake. The resulted values pose no health risks because a large amount of mushroom should be consumed for heavy metal toxicity to happen. The study indicates that 25% - 50% white cotton textile wastes are suitable as a sustainable substrate for cultivating oyster mushroom, waste reduction and food security. It also suggests that there is a need for further experiments on various aspects of mushroom cultivation and testing the availability of additional toxicity contaminants, and micro-plastics before recommending this substrate for long term consumption.

Keywords: *Estimated daily intake, Cotton textile waste, Upcycle, Heavy metals, Pleurotus ostreatus*