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“Reconcile land system changes
with planetary health”

Sustainable valorisation of agricultural waste: Repurposing spent oyster mushroom substrate as a safe livestock feed

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Abstract

Spent mushroom substrate (SMS) from *Pleurotus* spp. (oyster mushroom) cultivation offers potential as a safe, fibrous livestock feed when properly disinfected. Wheat straw was used as a substrate for this research. This study evaluated the effectiveness of three disinfection methods – steaming, sodium hypochlorite, and calcium hydroxide – on wheat straw used as a substrate. After cultivation and harvest, SMS was analysed for mycotoxigenic fungi, parasitic protozoa, and nematodes. Nine fungal species were identified, with *Aspergillus* spp. dominating, particularly *A. niger*, *A. flavus*, and *A. parasiticus*. Six protozoan species were found, including *Paramecium*, *Giardia lamblia*, and *Trichomonas vaginalis*. Nematodes were extracted using the Tullgren funnel technique. Statistical analysis (ANOVA, $p < 0.001$) showed that disinfection method and duration significantly influenced pathogen prevalence. Calcium hydroxide was most effective against nematodes, sodium hypochlorite suppressed fungal growth, and steaming controlled protozoa. Principal Component Analysis (PCA) revealed strong associations between *A. niger* and steaming for 2 hours, while *T. vaginalis* showed weak association with the same. Although SMS can harbour harmful microbes, appropriate disinfection can significantly improve its safety as livestock feed. Further research is needed to develop environmentally friendly disinfection alternatives to chemical treatments.

Keywords: Biosafety, spent oyster mushroom substrate