Sustainable and Appropriate Technology System (SATS) Using Spent Mushroom Substrate for Restoring Soil Ecosystem Health

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Spent mushroom substrate (SMS) is waste after harvesting mushrooms and it is high in organic matter. The objectives of this study are to evaluate the usability of SMS for restoring soil ecosystem health and to propose a sustainable and appropriate technology system (SATS) for solving poverty, desertification and environmental pollution problems. The SMS compost was prepared by composting the SMS from Pleurotus ostreatus production. The growth rate of Zea mays in the barren soil amended with the SMS compost was 1.5~2.0 times higher than that in raw barren soil. When the SMS was added to the soil contaminated with Cu, Pb and Cd, the heavy metals were immobilized stably on the SMS, resulting in little leaching of the heavy metals from the soil. These results indicate that the SMS, one of the agricultural wastes, can be used as upcycle resources; the SMS compost to enrich soil and the SMS remedial additive of contaminated soil. Based on our results, we proposed the ‘SATS’ including mushroom cultivation using agricultural residues and the enhancement of soil ecosystem health using the SMS compost and remedial additive. Mushroom cultivation can create economic profits, and the use of SMS compost can increase crop yields. Applying the SMS remedial additive to contaminated soil can prevent the secondary pollution of surrounding water and soil, ultimately resulting in the improvement of life quality by providing safe agricultural products and promoting local residents’ health. The proposed system is an integrated solution for various problems in developing countries.

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