

Vermicomposting Amended With Microorganisms and Biochar: Phytopathogen Resistant Seedbeds for Vegetables and Heavy Metal Polluted Waste Treatment

Authors : Fuad Ameen, Ali A. Al-Homaidan

Abstract : Biochar can be used in numerous biotechnological applications due to its properties to adsorb beneficial nutrients and harmful pollutants. Objectives: We aimed to treat heavy metal polluted organic wastes using vermicomposting process and produce a fertilizer that can be used in agriculture. We improved the process by adding biochar as well as microbial inoculum and biomass into household waste or sewage sludge before vermicomposting. The earthworm *Eisenia fetida* used in vermicomposting was included to accumulate heavy metals, biochar to adsorb heavy metals, and the microalga *Navicula* sp. or the mangrove fungus *Acrophialophora* sp. to promote plant growth in the final product used as a seedbed for Solanaceae vegetables. We carried out vermicomposting treatments to see the effect of different amendments. Final compost quality was analyzed for maturity. The earthworms were studied for their vitality, heavy metal accumulation, and metallothionein protein content to verify their role in the process. The compost was used as a seedbed for vegetables that were inoculated with a phytopathogen *Pythium* sp. known to cause root rot and destroy seeds. Compost as seedbed promoted plant growth and reduced disease symptoms in leaves. In the treatment where *E. fetida*, 6% biochar, and *Navicula* sp. had been added, 90% of the seeds germinated, while less than 20% germinated in the control treatment. The experimental plants had acquired resistance against *Pythium* sp. The metagenomic profile of microbial communities will be reported.

Keywords : organic wastes, vermicomposting process, biochar, mangrove fungus

Conference Title : ICAEMME 2022 : International Conference on Advances in Environmental Microbiology and Microbial Ecology

Conference Location : Helsinki, Finland

Conference Dates : July 19-20, 2022