World Academy of Science, Engineering and Technology
International Journal of Bioengineering and Life Sciences
Vol:12, No:06, 2018

White-Rot Hymenomycetes as Oil Palm Log Treatments: Accelerating Biodegradation of Basal Stem Rot-Affected Oil Palm Stumps

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Abstract : Sustainability of oil palm production in Southeast Asia, especially in Indonesia and Malaysia, is jeopardized by Ganoderma boninense, the fungus which causes basal stem rot (BSR) in oil palm. The root contact with unattended infected debris left in the plantations during replanting is known to be the primary source of inoculum. Abiding by the law, potentially effective technique of managing Ganoderma infected oil palm debris is deemed necessary because of the zero-burning policy in Malaysian oil palm plantations. White-rot hymenomycetes antagonistic to Ganoderma sp were selected to test their efficacy as log treatments in degrading Ganoderma infected oil palm logs and to minimize the survival of Ganoderma inoculum. Decay rate in terms of mass loss was significantly higher after the application of solid-state cultivation (SSC) of Trametes lactinea FBW (64% ±1.2), followed by Pycnoporus sanguineus FBR (55% ±1.7) in infected log block tissues, after 10 months of treatments. The degradation pattern was clearly distinguished between the treated and non-treated log blocks with the developed SSC formulations. The control infected log blocks showed the highest, whereas infected log blocks treated with either P. sanguineus FBR or T. lactinea FBW SSC formulations exhibited statistically lowest number of Ganoderma spp. recovery on Ganoderma Selective Medium (GSM), after 8 months of treatment. Out of that, the lowest recovery of Ganoderma spp. was reported in infected log blocks inoculated with the strain T. lactinea FBW (21% ± 0.9) followed by P. sanguineus FBR (33% ± 2.2), after 8 months, Further, no recovery of Ganoderma was noticeable, 10 months after treatment applications in log blocks treated with both of the formulations. This is the first nursery-base study to substantiate the initial colonization of white-rot hymenomycetes on oil palm log blocks previously infected with BSR pathogen, G. boninense. The present study has indicated that log blocks treatment with white-rot hymenomycetes significantly affected the mass loss of diseased and healthy log block tissues. This study provides a basis of biotechnological approaches inefficient degradation of oil palm-generated crop debris, under natural conditions with an ultimate aim of reducing the Ganoderma inoculum under heavy BSR infection pressure in eco-friendly manner.

Keywords : basal stem rot disease, ganoderma boninense, oil palm, white-rot fungi
Conference Title : ICFDMTF 2018 : International Conference on Forest Disease Management and Tropical Forestry
Conference Location : Paris, France
Conference Dates : June 25-26, 2018