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Biochar effects on soil-resident ligninolytic fungi: in vitro growth response and its pH dependence

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Ligninolytic fungi play an essential role on soil fertility because of their decomposing activity that allows nutrients inside biomasses to be released back into the soil. Their enzymes are able to degrade lignin which is otherwise recalcitrant to microbial and chemical degradation. Biochar (BC) has been recently proposed as a soil amendment that may contribute to climate change mitigation via carbon sequestration in soil. Pyrolysis conditions, feedstock and several other factors affect BC characteristics which in turn may influence BC impact on soil microorganisms and terrestrial ecosystems. However, limited information is available in the literature about BC's impact on ligninolytic fungi. The objective of this in vitro study was to assess the impact of BC and pH change caused by BC addition on three soil-resident ligninolytic fungi, *Pleurotus ostreatus, Trametes versicolor* and *Bjerkandera adusta*. The BC sample used in this study was obtained from 100% red spruce pellets pyrolysed at a temperature of 550 °C, and it was added to PDA medium directly as solid BC at the doses of 2 g L-1 (BC-LD) and 10 g L-1 (BC-HD). pH values were determined and the experiments were conducted either adjusting the pH of the controls either without pH adjustment. The fungi were inoculated separately in Petri dishes filled with the various media and the radial mycelial growth was measured at several sampling times. Results obtained showed a fungal growth response clearly dependent on the species and the BC dose. BC-LD stimulated the growth of *P. ostreatus* and *T. versicolor*, whereas it inhibited that of *B. adusta*. BC-HD stimulated the growth of *P. ostreatus* and inhibited that of *T. versicolor* and *B. adusta*. Similar responses were obtained with or without pH adjustment for *P. ostreatus* and *T. versicolor*, whereas a pH dependency was found for *B. adusta*. The effects of these and other pertinent treatments on fungal enzymes of the fungi are currently under investigation.