Chiu, S. W., Ching, M. L., Fong, K. L. & Moore, D. (1998). Spent oyster mushroom compost is superior to many mushroom species for biodegradation of the biocide pentachlorophenol. Poster at the Sixth International Symposium of the Mycological Society of Japan, Chiba University, Japan, 26-27 November, 1998. In Progress in Mycological Sciences in Japan and the United Kingdom, Proceedings of the Sixth International Symposium of the Mycological Society of Japan (ed. Y. Kitamoto, Y. Harada & A. Suzuki), p. 96. Mycological Society of Japan: Tokyo.

Spent oyster mushroom compost is superior to many mushroom species for biodegradation of the biocide pentachlorophenol

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Chlorophenols have been commonly used as disinfectants and preservatives but their recalcitrant nature, persistence and toxicities make them priority pollutants for treatment. The ability of various fungi (*Armillaria gallica*, *A. mellea*, *Ganoderma lucidum*, *Lentinula edodes*, *Phanerochaete chrysosporium*, *Pleurotus pulmonarius*, a *Polyporus* sp., *Coprinus cinereus* and *Volvariella volvacea*), and the spent mushroom substrate of *P. pulmonarius* (SMS) to remove pentachlorophenol (PCP) was compared using a batch cultivation system. The PCP content was monitored by reversed phase high performance liquid chromatography, and the breakdown products were determined by gas chromatography-mass spectrometry (GC-MS). Possession of ligninolytic ability was determined by ability to decolourise the dye Poly-R478 at two N levels. Not all the fungi tested decolourised the dye, and for those that did, not all showed N-modulation response on dye decolourisation. All these fungi showed active breakdown in addition to biosorption as their PCP removal mechanisms. The tolerance level of the fungus towards PCP did not correlate with its degradative capacity, or to its ability to decolourise Poly-R478. The *A. mellea* strain showed the highest degradative capacity (10 mg PCP g^{-1} mycelium; dry weight) while the *Polyporus* strain possessed the greatest biosorption capacity (31 mg PCP g^{-1} mycelium, dry weight). In comparison, *Pleurotus* SMS harbouring both bacteria and fungi functioned over a wide range of initial PCP concentrations and reached a higher degradative capacity (19 mg PCP g^{-1}) in only 3 days. GC-MS chromatograms revealed only residual PCP peaks in SMS extracts, a contrast with the fungal mycelial incubations in which a variety of breakdown products were detectable. Use of SMS for bioremediation of biocide-contaminated sites seems promising.