

MICROBIOLOGICAL IMAGE

Colonization of cigarette butts, a toxic waste, by white rot fungi



Colonización de colillas de cigarrillo, un residuo tóxico, por hongos de pudrición blanca

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Cigarette butts (CBs) are complex pollutants, consisting of a filter made of non biodegradable acetate cellulose fibers, and a paper wrapping. After smoking, part of the toxic chemicals from burnt tobacco (nicotine, nitrosamines, polycyclic aromatic hydrocarbons, among others) are retained in the filter and may be leached when in contact with water, contaminating aquatic environments². Since currently there is no treatment for this residue, our project aims to employ white rot fungi as an alternative for detoxifying CBs. After selecting fungal strains for their effectiveness in detoxifying the material (unpublished results), further research on the colonization of the CBs was carried out. Wet CBs were inoculated with 2 different fungal strains isolated from Argentinean rainforest (*Trametes* sp. BAFC4767 and *Irpex lacteus* BAFC4766). They were grown in humid conditions, at 28 °C in the darkness for 6 weeks. A CB sample of each treatment was air dried, cut longitudinally and transversely, and coated with gold/palladium for scanning electron microscope (SEM) observation. Non treated CBs (Fig. 1) showed a

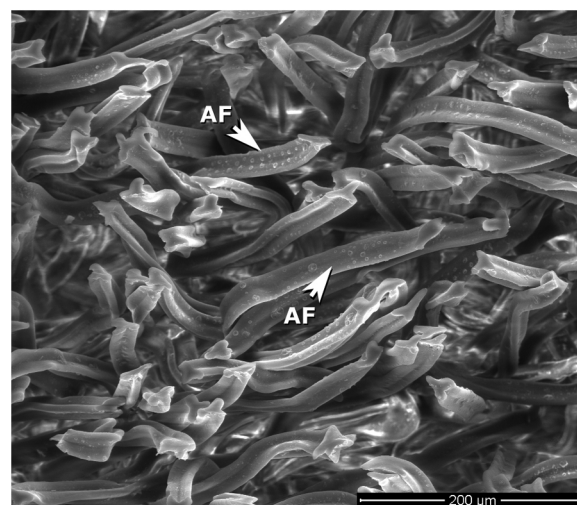


Figure 1 SEM image of a transversal section of non treated CB. AF: acetate fibers of the filter.

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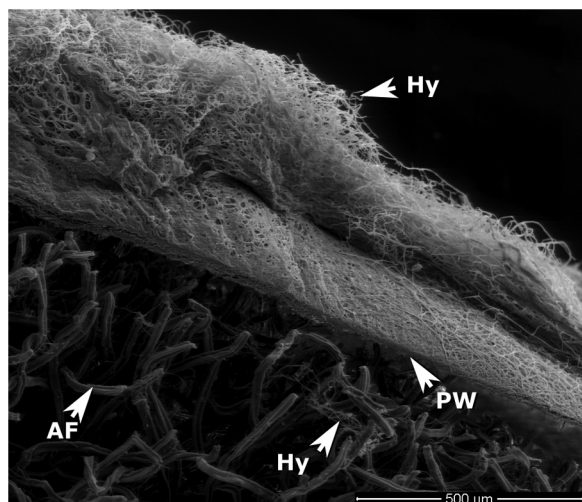


Figure 2 SEM image of a longitudinal section of CB treated with strain BAFC4767. AF: acetate fibers; Hy: mycelium hyphae; PW: paper wrapper. Hyphae have pierced through the CB paper wrapper and can be seen on the inside of the filter, among the acetate fibers.

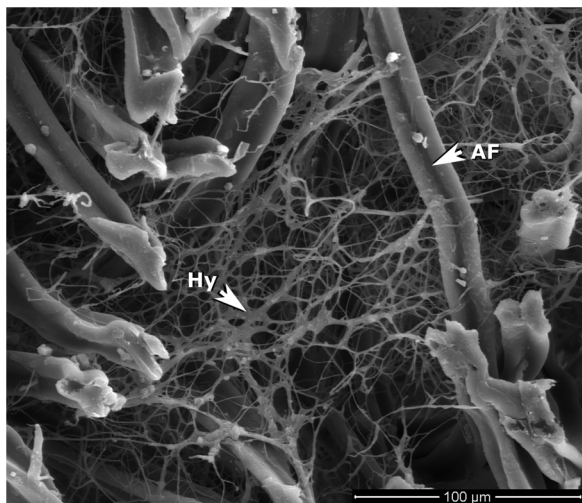


Figure 3 SEM image of a transversal section of CB treated with strain BAFC4766. AF: acetate fibers of the filter; Hy: mycelium hyphae. The photograph was taken at the center of the CB, and shows evidence of the deep hyphal penetration.

more compact fiber structure than the treated ones. Fungal growth both on the outside and the inside of the CBs was observed for all treatments (Figs. 2 and 3). Most of the mycelium developed around the paper wrapper (PW), which displayed signs of deterioration and is supposed to be the fungus food source. It was noteworthy to observe such a degree of fungal invasion on the inside of the CBs, since this part is where most of the toxic chemicals are concentrated. These results support the detoxifying capacity observed for the selected fungi. White rot fungi are known for their ability to degrade and detoxify xenobiotics such as phenolic compounds and aromatic hydrocarbons¹. To the best of our knowledge, this is the first visual report of CBs fungal colonization.

Conflict of interest

No potential conflict of interest was reported by the author.

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