

Reference

341

## Fungal growth on coffee husks and spent ground under solid-state cultivation conditions

Machado, Ercília M. S.; Rodriguez-Jasso, Rosa M.; Mussatto, Solange I.; Teixeira, José A.

Universidade do Minho, Portugal

E-mail: lyamachado86@gmail.com

**Keywords:** Coffee Husks, Spent Ground, Solid-state cultivation, fungal growth

### Abstract

The processing of coffee generates significant amounts of agricultural wastes. Coffee husks, comprised of dry outer skin, pulp and parchment, are probably the major residues from the handling and processing of coffee (1). Coffee spent ground is the main coffee industry residue obtained during the processing of raw coffee powder to prepare “instant coffee”. Coffee husks and spent ground are generated in more than two millions tons yearly (2), and the major problem encountered by the industries is the disposal of these residues, since they contain some amount of caffeine, polyphenols and tannins, which makes them toxic in nature (3).

Filamentous fungi are microorganisms able to growth over complex substrates behind minimal conditions, and play an important role in the generation of natural compounds with high commercial interest. Therefore, the aim of the present work was to evaluate the ability of some fungal strains to growth on coffee husks (basically the parchment skin - the hull that surrounds the coffee bean), and spent grounds, as an alternative to add value to these toxic residues.

Strains from the genus *Aspergillus*, *Penicillium*, *Mucor* and *Neurospora* were used. Microbial growth was carried out in Petri plates containing 30% of coffee husks or spent ground and 70% of Czapek-Dox saline media, pH 5.0. The plates were inoculated with a suspension containing  $5 \times 10^6$  spores/g dry residue, and maintained at 28°C for 5 days. The spore suspension was prepared by scrap down the spores from PDA plates with a sterilized solution of 0.2% Tween 80, and counted in a Neubauer chamber. Cultivations were done in duplicate to each fungal in each different substrate. Radial growth rate ( $U_r$ , mm/h) was monitored kinetically measuring colony diameters every 12h.

All the evaluated fungal strains showed mycelium presence over both residues. For almost all the strains, the invasion capacity was higher in coffee spent ground than in coffee husks. Highest growth rates were obtained with *Neurospora crassa*, with values of 0.99 and 0.76 mm/h for spent ground and husks, respectively. It was thus concluded that coffee husks and spent grounds can be successfully used as substrate for fungal strains growth. Among the evaluated strains *Neurospora crassa* gave the best results and could be thus evaluated in solid-state fermentation processes for the obtainment of compounds with commercial interest from these two agro-industrial residues.

(1) Saenger M., Hartge E.-U., Werther J., Ogada T., Siagi Z. (2001) *Renew. Energy* 23: 103–121.

(2) Fan L., Pandey A., Mohan R., Soccol C. R. (2000) *Acta Biotechnol.* 20:41-52.

(3) Pandey A., Soccol C.R., Nigam P., Brand D., Mohan R., Roussos S. (2000) *Biochem. Eng. J.* 6:153-162.