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A decade of mycotoxin research at the Institute of Biotechnology and Bioengineering

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Filamentous fungi are fundamental to applied microbiology. An area of increasing concern is contamination of foodstuff with toxins from these fungi, which are referred to as mycotoxins. The mycotoxin secondary metabolites cause disease in animals and humans and, for example, aflatoxins have been responsible recently for fatal human outbreaks in Kenya. Our researchers have been involved in research on mycotoxins and the work has grown exponentially in the previous decade. Mycotoxin problems commence locally and extend globally: Bottled water and wines from the North of Portugal have been studied with a view to control fungi and mycotoxins. Now we are expanded into considering the implications of climate change on mycotoxins on a worldwide basis. The use of mycotoxins and fungi as bioweapons in our increasingly security-conscious society, has been discussed by our researchers. Surprisingly, the fungi that produce mycotoxins are required to be characterized using novel methods as conventional procedures often prove to be inadequate. Undertaking this task is a primary objective of our research. Novel fungal identification schemes have been devised and issues of whether isolated taxa truly represent those in the environment have been addressed, with ramifications relating to optimal control. Current projects include the health and quality risks from fungal contamination of grape products (e.g. wine), apples, cheese, chilies, nuts and corn: Fungi in drinking water are a particular concern. *Aspergillus ochraceus*, *Aspergillus flavus*, *Aspergillus niger*, *Penicillium expansum* and *Fusarium graminearum* especially are relevant to our work: Associated mycotoxins are ochratoxin A, aflatoxins, patulin, citrinin and zearalenone. Furthermore, we study the volatile earthy off-aromas in wine caused by the interactions of the fungi *Botrytis cinerea* and *P. expansum*. The analytical techniques employed throughout our work include PCR, HPLC, GC-MS and MALDITOF MS for strain characterization and analysis of commodities. Critical assessments of these methods have been performed and potential problems discovered with diagnostic PCR equally apply to bacteria. A key objective is international collaboration with other researchers. Our strains are well characterized for toxicity and are kept under optimal preservation techniques. This presentation will describe the progress made by this innovative laboratory over the previous 10 years, while looking forward to future progress.

Selected publications:

Abrunhosa *et al.* (2001) *Letters in Applied Microbiology* 32, 240-242.

Paterson, R.R.M. (2006) *Food Control* 17, 741-744.

Paterson & Lima (2010) In: *Molecular, Clinical and Environmental Toxicology, Volume 2 Clinical Toxicology*. A. Luch (ed). Springer, Germany, 31-63.

Paterson & Lima N. (2010) *Food Research International*. 43, 1902-1914.

Rodrigues *et al.* (2009) *International Journal of Food Microbiology*, 129, 187-193