

Flavours from indigenous fungi

Prepared by Aisha Mahomed-Ali: (MSc student working on project entitled: "Production of flavours and fragrances from South African fungi")

The use of fungi for natural flavour production is beneficial as it overcomes certain obstacles when natural flavours are derived from plants. South Africa is known for its unique plant and animal life, which is also reflected in its mycoflora that resembles a unique diversity in its ability to produce flavours. The CMW culture collection at the Forestry and Agricultural Biotechnology Institute (FABI) is regarded as the largest fungal collection on the African continent. It hosts a variety of fungi obtained from natural forests and plantations, representing fungi from around the world. Selected isolates from this collection, together with fungi from the CSIR culture collection that represents food and other environmental niches; were selected and evaluated for the production of flavours that resembles pyrazine compounds.

A sensory evaluation study by means of a trained sniffing panel was used to determine which fungi were possible pyrazine producers. This study indicated that 45% of the 280 fungi evaluated produced caramel, meaty, nutty, chocolate, coffee, green and potato odours, which are characteristic of pyrazine flavours. Results showed that the green flavour produced by members of the genera, *Aspergillus* and *Penicillium*, was most prominent.



Although the human nose is extremely sensitive in the identification of odours, specific components need to be confirmed using a GC-MS. The chemical analyses of 11 selected fungi showed that 7 were pyrazine producers. The production of methoxypyrazines (green pepper flavour), by *Penicillium rubrum* and *Penicillium purpurogenum* was confirmed by mass spectral data obtained from chemical standards as well as that from the Wiley library. This was the first report of the production of methoxypyrazines by *Penicillium rubrum* and *Penicillium purpurogenum*.

The green pepper flavour can be considered as a high impact aroma chemical and is therefore of importance to the flavour and fragrance industry. Chemical methods for the extraction and quantification of the pyrazines produced by these fungi were also developed. Soya press cake, a by-product in the production of biofuels, was also evaluated for the production of methoxypyrazines by these fungi. However, the fungal and lipid content present in the soya as well as the particle size had a significant effect on the fermentation process and thus cannot be used in its original state for the production of methoxypyrazines by the *Penicillium* species.

Various parts of this project has been presented in the form of two poster presentations at SAAFoST'S 18th Biennial International Congress in Stellenbosch in 2005 and the 45th Congress of the Southern African Society for Plant Pathology in Benoni in 2007 as well as one oral presentation at the 14th Biennial Congress of the South African Society for Microbiology in Pretoria in 2006.

This project indicates that mycelial fungi can be used to produce natural flavours and therefore proves the importance of preserving the fungal diversity of South Africa for next generations to come. These fungi will also be of benefit to the flavour and fragrance industries as they eliminate the obstacles faced in the production of natural flavours from plants and allow them to produce natural flavours that are constant in its quality and quantity.