

Technical note: Cellulase and exo-amylase in experimental soy sauce fermentations

S. K. GOEL* AND B. J. B. WOOD†

Introduction

Previous reports have dealt with the production of a number of enzymes, including sucrase, endo-amylase (α -amylase), proteinase, lipase and tyrosinase during the growth of *Aspergillus oryzae* in the Koji (mould growth) stage of soy sauce production, and with their survival into the Moromi (brine fermentation) stage (Yong & Wood 1975, 1976, 1977*a, b*). The history, technology, microbiology and biochemistry of soy sauce have been reviewed by Yong & Wood (1974), and the relationships of the soy sauce fermentation to other food fermentations have been discussed by Wood & Yong (1974), Wood *et al.* (1975) and Wood (1977).

The present report deals with the participation of cellulase and exo-amylase in soy sauce fermentation. Production of both of these types of enzyme by members of the genus *Aspergillus* including *A. oryzae* has been long been known, but, so far as we have been able to ascertain, no evidence relating to the participation of cellulase in the soy sauce fermentation has been published. The disintegration of the initially intact beans during the Moromi fermentation suggested to us that considerable degradation of the cell walls must be taking place, and this would suggest cellulase involvement. In the case of exo-amylase, many writers on the soy sauce fermentation infer that this type of activity participates in the extracellular hydrolyses effected by the mould, and the levels of reducing sugar present in the latter stages of the Koji fermentation (Yong & Wood 1977*a*), can only be explained at all readily through the participation of exo-amylase. Morita *et al.* (1966) describe its presence in rice Koji.

In the course of the work which forms the basis of the present report, we were primarily concerned with technological aspects of the fermentation, and

*Present address: Department of Microbiology, Institute of Science, Kile Ark, Aurangabad, 43-001, Maharashtra, India.

†To whom all correspondence regarding this paper should be addressed.

Authors' address: Department of Applied Microbiology, University of Strathclyde, Royal College Building, George Street, Glasgow G1 1XW.