

Title Growth and mycotoxin production by food spoilage fungi under high carbon dioxide and low oxygen atmospheres

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Abstract

The influence of high carbon dioxide and low oxygen concentrations on growth by the foodborne fungal species, *Mucor plumbeus*, *Fusarium oxysporum*, *Byssoschlamys fulva*, *Byssoschlamys nivea*, *Penicillium commune*, *Penicillium roqueforti*, *Aspergillus flavus*, *Eurotium chevalieri* and *Xeromyces bisporus* was investigated. Production of aflatoxin by *A. flavus*, patulin by *B. nivea* and roquefortine C by *P. roqueforti* was also studied. Fungal growth was evaluated under atmospheres consisting of 20, 40 and 60% CO₂ plus < 0.5% O₂, on two media, Czapek Yeast Extract agar and Potato Dextrose agar. Several methods for measuring fungal growth were used: colony diameter, ergosterol content, hyphal length and/or mycelium dry weight. Among the nine species, three groups were distinguished with respect to their growth responses under modified atmospheres: (i) species which did not grow in 20% CO₂ < 0.5% O₂ (*P. commune*, *E. chevalieri* and *X. bisporus*); (ii) species which grew in 20% CO₂ < 0.5% O₂, but not 40% CO₂ < 0.5% O₂ (*P. roqueforti* and *A. flavus*); (iii) species which grew in 20%, 40% and 60% CO₂ < 0.5% O₂ (*M. plumbeus*, *F. oxysporum*, *B. fulva* and *B. nivea*). Facultatively anaerobic behaviour was observed in these last four species, which grew under the same conditions as the obligate anaerobe, *Clostridium sporogenes*. The production of aflatoxin, patulin, and roquefortine C was greatly reduced under all of the atmospheres tested.