

GROWTH OF FUNGI IN HIGH CARBON DIOXIDE AND LOW OXYGEN ATMOSPHERES

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Food and grain spoilage fungi are traditionally regarded as aerobic organisms, but some species are efficient scavengers, and are capable of near normal growth in very low concentrations of oxygen. The extent to which fungi are able to develop in low oxygen atmospheres often depends on the concentration of carbon dioxide that is present, as atmospheres high in CO₂ are often more effective in controlling fungal growth. Although atmospheres of 20% CO₂ inhibit the growth of many fungi, >80% CO₂ may be required to prevent fungal deterioration in high moisture commodities. The growth of seven species of spoilage fungi was studied in atmospheres where residual oxygen was controlled at less than 0.5%, and the CO₂ concentrations were 20%, 40% or 60%, with the balance being the inert filler gas, nitrogen. The potential for mycotoxin production was also assessed. Residual oxygen was a much more critical factor than CO₂ concentrations in reducing growth of *Penicillium* and *Aspergillus* species. *Mucor plumbeus*, *Fusarium oxysporum* and two *Byssoschlamys* species were able to grow in all atmospheres tested, although growth was reduced as CO₂ concentration increased. All species tested were able to grow in an atmosphere of 80% CO₂ with 20% O₂, but, growth was slower than in air, particularly for the *Penicillium* species and *Aspergillus flavus*. Gas composition had a greater effect on mycotoxin production than on growth.