

**Title** Effect of  $a_w$  and CO<sub>2</sub> level on *Aspergillus flavus* growth and aflatoxin production in high moisture maize post-harvest

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#### Abstract

The potential for using modified atmospheres of 25–75% CO<sub>2</sub> (balanced with N<sub>2</sub>) and water activity ( $a_w$ , 0.95, 0.92) to control *Aspergillus flavus* development and aflatoxin B<sub>1</sub> production has been evaluated (a) on synthetic medium and (b) on maize grain during storage for up to 21 days at 25 °C. On agar medium up to 75% CO<sub>2</sub> at both 0.95 and 0.92  $a_w$  significant inhibition of growth was obtained ( $P < 0.05$ ). In stored grain inoculated with spores of *A. flavus* there was significantly higher populations of the species at 0.95  $a_w$  than 0.92  $a_w$ . Up to 75% CO<sub>2</sub> resulted in an inhibition of the populations of *A. flavus* isolated from the grain. Contrasting aflatoxin B<sub>1</sub> production was obtained on agar and in stored maize grain. On agar, greatest amounts were produced at 0.92  $a_w$ , while more was produced at 0.95  $a_w$  on maize grain. Overall, the efficacy of controlled atmospheres  $\times a_w$  showed that treatment with 25% CO<sub>2</sub> could be sufficient to efficiently reduce *A. flavus* development but at least 50% CO<sub>2</sub> was required to obtain a significant reduction of aflatoxin synthesis.