

Title Fungi control by phosphine fumigation in high-moisture maize.
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Abstract

Control of fungal growth by phosphine was studied in maize stored with high moisture contents. In addition to the natural microflora of the grains, the product was inoculated with an *Aspergillus flavus* toxigenic strain. Surface response methodology was used in order to assess the various effects of phosphine on fungal growth in the grains, at water activities from 0.85 to 0.98 (equivalent to 16.0% and 24.5% m.c., w.b.), phosphine concentrations from 0 to 4 g/m³ and exposure periods from 1 to 15 days to the fumigant. The control of fungal growth was evaluated by direct plating of the grains, the serial dilution technique and the ergosterol content. Analyses of m.c., water activity and aflatoxins were also carried out on the samples subjected to the different treatments. Phosphine concentrations were measured by gas chromatography. An analysis of the results showed that, in general, the phosphine concentration was more important than the exposure period to the fumigant for fungal control. At water activities higher than 0.92, grains should not be kept for periods longer than about seven days due to the growth of *Fusarium verticillioides* (a potential fumonisin producer) and yeast and yeast-like moulds which seemed to be more tolerant to this fumigant. Aflatoxins were not detected in the fumigated samples. It was concluded that phosphine can control fungal growth and the production of aflatoxins and could thus be applied to grains while they are waiting to be properly dried or rewetted during storage or transportation.