Title Ethylene and CO_2 Inhibit aflatoxin B1 biosynthesis In *Aspergillus parasiticus* grown on peanuts

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Citation Book of Abstracts, 2004 IFT (Institute of Food Technologists) Annual Meeting and Food Expo, 13-16 July 2004, Las Vegas, Nevada, USA. 321 pages.

Keywords peanut; ethylene; aflatoxin

Abstract

Aflatoxin is a potent carcinogen produced by several fungi belonging to the genus *Aspergillus.* These fungi frequently produce aflatoxin contamination on a variety of food and feed crops including peanuts. In preliminary studies using a solid defined growth medium (GMS), we observed that ethylene treatment at very low dose levels reduced aflatoxin synthesis in a dose-dependent manner. Ethylene, a natural plant growth hormone produced during fruit ripening, is food-safe and relatively inexpensive to generate in sufficient quantities for treatment of stored plant materials. Our objective was to determine if ethylene demonstrated potential for use in a modified storage atmosphere for reduction of aflatoxin production by *A. parasiticus* on stored crops. Peanuts were used as a model crop. Conidiospores of *Aspergillus parasiticus* D8D3 (-106/g peanuts) were inoculated on peanuts (4g) contained in a Petri dish. Petri dishes were placed in a growth chamber and continually flushed with air containing variable concentrations of CO_2 and/or ethylene. The growth chamber was incubated at 30°C in the dark for 6 days. Gas chromatography confirmed estimated gas concentrations in the growth chamber. Aflatoxin in peanuts and was quantified by thin layer chromatography and ELISA. Our result indicated that ethylene treatment (2 ppm) decreased aflatoxin B1 accumulation 10 fold while CO_2 treatment (0.1%) decreased aflatoxin B1 approximately 3 fold. Additive effects between CO_2 and ethylene were also observed in particular experiments. The data suggest that ethylene and CO_2 could be used alone or together to reduce aflatoxin accumulation on infected seeds during storage. We must now optimize ethylene/ CO_2 concentration to maximize the inhibitory effect. These studies have important implications to crop loss due to aflatoxin contamination.