

Title Fumigation with essential oil of mustard retards fungal growth and accumulation of ergosterol and free fatty acid in stored shelled groundnuts

Author O.D. Dhingra, G.N. Jham, F.Á. Rodrigues, G.J. Silva Jr. and M.L.N. Costa

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Abstract

Shelled groundnut (*Arachis hypogaea*) samples with moisture contents (m.c.) between 7.5 and 10.5% and inoculated with conidia of *Aspergillus glaucus* and *A. parasiticus* were stored for 15–90 days at 25 ± 2 °C, and fumigated with synthetic food grade essential oil of mustard (100 µl/l space). Deterioration of the samples was assessed by estimating the percentage of kernels colonized by fungi, the number of colony forming units (CFUs)/kernel, and the accumulation of ergosterol and free fatty acids (FFA). The values of these variables increased with the m.c. and storage period, independent of the fumigation treatment; however, the rate of increase was significantly lower in fumigated samples. After 90 days storage, the proportion of kernels yielding *A. glaucus* was similar in all samples, but the number of CFUs was 300×, ergosterol content 3.6× and FFA 4× higher in non-fumigated than in fumigated samples. In fumigated samples, no molded kernels were visible, while many were seen in non-fumigated samples after 30 or 60 days storage at 10.5 or 9.3% m.c., respectively. The deterioration retardation featured a reduced inoculum on kernel surfaces. *Aspergillus parasiticus* did not colonize kernels independently of m.c. and fumigation treatments. There was a strong positive correlation between CFUs and ergosterol or FFA content when the data of fumigated and non-fumigated samples were analyzed separately. However, this relationship was absent when data were pooled to disregard the fumigation effect. The correlation between ergosterol and FFA content remained high regardless of the fumigation treatment ($r = 0.99$). The ergosterol or FFA content of stored groundnuts can be used interchangeably, as a sensitive indicator, to assess deterioration caused by xeric storage fungi. However, the latter was preferable because it was simpler to assess and provided a direct indication of economic losses due to reduced oil yield.