Title Modelling the effect of temperature and water activity on the growth of *Aspergillus parasiticus* on irradiated Argentinian flint maize

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Citation Journal of Stored Products Research,Volume 47, Issue 1, January 2011, Pages 1-7

Keywords *Aspergillus parasiticus*; Maize; Predictive mycology; Water activity; Temperature; Modelling; Gompertz equation

Abstract

A full factorially designed experiment including storage temperature (10, 20, 30 and 37 °C) and water activity (0.88, 0.92 and 0.96) was undertaken to study the growth of *Aspergillus parasiticus* in maize samples. Kinetic parameters such as specific growth rate (μ), lag phase duration and maximum logarithmic increase were determined by fitting the Modified Gompertz equation to the viable mould count data (N in CFU/g) as a function of time collected in twelve experiments. The average coefficient of determination (R^2) was 0.987, being the mean standard deviation of the estimate of 0.216 in units of $\log_{10}N$. In the practical range of 10–30 °C, the relationship of the three kinetic parameters with temperature was described by second order polynomial expressions, whose parameters, in turn, depended on water activity. The combined or full model i.e., the Modified Gompertz model with its parameters expressed as a function of temperature and water activity, was able to predict $\log_{10}N$ with an average percentage error of 4.3, so agreement with the experimental data was highly satisfactory.

In a simulation exercise, the full model was able to predict the viable mould count, given an initial value and grain temperature and water activity histories, with promising results for maize storage.