Title The effect of moisture level on high-moisture maize (*Zea mays* L.) under hermetic storage conditions—in vitro studies

Author Z.G. Weinberg, Y. Yan, Y. Chen, S. Finkelman, G. Ashbell and S. Navarro

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Abstract

Under humid and warm conditions harvested grains are susceptible to molding and rapid deterioration. Therefore, they should be dried to safe moisture levels that inhibit the activity of microorganisms. Drying to these moisture levels is not economical for farmers in developing countries. Preservation of grains at intermediate moisture levels under hermetic storage conditions could be feasible and economical in warm and moist climates.

The purpose of the current study was to examine the effect of various moisture contents (m.c.) on the quality of maize grains in self-regulated modified atmospheres during hermetic storage.

Maize at 14, 16, 18, 20 and 22% m.c. was initially conditioned for 28 days in tightly wrapped plastic bags and then stored in sealed containers at 30 °C for up to 75 days. Carbon dioxide produced within the containers replaced the oxygen. As the m.c. increased the time for O_2 depletion shortened, from 600 h at 14% m.c. to 12 h at 22%. The maize at 20 and 22% m.c. exhibited the highest dry matter (DM) losses, the lowest germination rates and the highest yeast and bacteria counts. The major fermentation product in the hermetically sealed maize was ethanol (0–5 g kg^{-1} DM), along with lower concentrations of acetic acid (0–1 g kg^{-1} DM).

The results obtained from the *in vitro* experiments indicate that maize at the tested moisture levels can be stored satisfactorily under sealed conditions in which self-regulated atmospheres provide protection against microflora damage. Further large-scale trials will be needed to evaluate the economic feasibility of storing high-moisture maize.