Title Response of storage molds to different initial moisture contents of maize (corn) stored at 25 °C, and effect on respiration rate and nutrient composition

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Abstract

Maize was stored for 2 months in chambers maintained at 25 °C to simulate conditions observed in the central part of the "Corn Belt" of the United States when the grain warms because of high summertime temperatures after a period of winter storage. Maize was brought to three moisture contents (m.c.) within the range typically observed in farm and commercial storage, and was inoculated to simulate the amount of storage mold contamination typical of this situation. Certain of the experimental units were packed in insulation so that heat could accumulate within the grain masses to simulate hot spots. The wettest grain heated rapidly and became semi-anaerobic. The hot grain then dried rapidly, with the amount of moisture loss influenced by the ratio of water vapor pressures inside and outside the grain. The hot grain cooled and became more aerobic over time. New infections by storage molds, disappearance of viable field molds, development of kernel damage, and changes in atmospheric gases within the grain masses were correlated with the grain moisture or temperature and the rate at which the moisture and temperature changed. The rate of increase in new kernel damage was as high as 3.3% per week. Both the rate of respiration and the estimated ratio of starch to fat consumed were associated with the mean grain m.c. during the trial, and the estimated ratio of starch to fat consumed was in the range of 2.2/1–2.6/1 in the grain containing 16.6–18.2% m.c. That both fat and starch were consumed calls into question loss estimates based on starch metabolism alone. The fat content of the grain decreased more than 10% in some experimental units, but increased less than 5% in others. The protein content generally increased as other grain constituents were consumed.