Title Evaluation of different temperature management strategies for suppression of *Sitophilus zeamais* (Motschulsky) in stored maize

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Abstract

Three years of experimental trials (2001–2003) were conducted in 12.7 t capacity pilot-scale bins to determine the survival, reproduction and suppression of*Sitophilus zeamais* Motschulsky under three temperature management strategies, no aeration (NA, control), ambient aeration (AA, ≤23.9 °C), and chilled aeration (CA, ≤18.3 °C) from May to November in Indiana, USA. One-way ANOVA indicated that the number of progeny for small adult populations of caged insects (0.14–0.28 insects per gram maize) embedded 0.6 m deep in the stored grain mass varied among temperature strategies for some, but not all of the storage periods. Progeny numbers in the CA strategy were significantly lower (P<0.05) than those for the NA and AA strategies for periods with longer hours of grain temperature ≤15.0 °C. There were no differences in progeny numbers between the NA and AA strategies for most of the storage periods. This may have been due to higher mortality, lower oviposition and fecundity from overcrowding of *S. zeamai*s under the NA strategy caused by factors in the caged insect microclimate (e.g., rapid food depletion, heating, moisture, molding, and high CO_2 levels). Our results suggest that maintaining stored maize at temperatures ≤15.0 °C for longer periods suppressed *S. zeamais* progeny more effectively than at ≤18.3 °C. In addition, leaving the stored grain bulk unaerated early in the spring so it remained cool at ≤15.0 °C due to winter aeration resulted in early suppression of *S. zeamais* progeny.