

Title Hermetic storage system preventing the proliferation of *Prostephanus truncatus* Horn and storage fungi in maize with different moisture contents

Author Martha. Y. Quezada, Josefina Moreno, Mario. E. Vázquez, Mariano Mendoza, Abraham Méndez-Albores and Ernesto Moreno-Martínez

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Abstract

Grain of maize, infested as well as uninfested with *Prostephanus truncatus* Horn, was stored for 15 days at 27 °C under hermetic and non-hermetic conditions. Grain moisture content (m.c.) was adjusted to 14, 15, 16 and 17%. Under hermetic conditions at 3 days storage, oxygen levels were 0.8, 0.6, 0.4 and 0.0% in grain with 14, 15, 16 and 17% m.c., respectively. However, at 6, 9, 12 and 15 days, the oxygen level dropped to 0% in all tested m.c. Insect mortality at 3 days storage under hermetic storage conditions ranged from 5 to 30%. At 6 days, insect mortality was 100% in maize with 14, 15 and 17% m.c. and 95% in grain with 16% m.c.; however, at 9 days of this m.c., mortality was 100%. In open storage, during the whole storage period and under all m.c. tested, *P. truncatus* manifested 0% mortality. The predominant fungus was *Aspergillus ruber*. The presence of this fungus was directly related to the m.c. and length of storage. Under hermetic conditions, in all m.c., the percentage of grain invaded by *A. ruber* ranged from 1 to 3%. In the open system, grain with 14 and 15% m.c. manifested low (1%) and moderate (13%) fungal invasion, respectively. However, at 16 and 17% m.c., the grain became strongly infested at 9, 12 and 15 days (61–97% infection). The reduction in grain germination was similar in both storage systems for all grain m.c., except for 17% at 12 and 15 days, since under hermetic conditions grain germination rates were higher than in the open system. Hermetic storage is an effective low cost-effective system for grain produced in the rural areas of developing countries.