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Vacuum Storage to Protect Durable Stored Products at Different Moisture Contents

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Abstract

Durables in the tropics are easily attacked by pest insects competing with man for resources. These insects increase product moisture contents by respiration and thus enable the development of mycotoxin-producing fungi. In warm climates stored product insects may already attack in the field. Consequently, the harvest may already be contaminated with life insects. A proper storage should thus not only avoid immigration of insects along volatile cues but should also control insects already developing in grains, pulses, dried tubers, oil seeds or nuts. This aim can be achieved in a sustainable way by vacuum storage. Because a vacuum proves a gas-tight and insect-proof seal and at the same time limits oxygen available to insects in the product. Studies with wheat grains in vacuum bags showed rapid mortality of all stages of granary weevils (*Sitophilus granarius*) and minimum damage to grain quality. Moisture contents, however, are critical for long-term storage because germination of seeds decreased below 90 % when wheat grains were stored at 20°C under vacuum (0.5 bar) at m.c. of 14 % or higher. At higher temperatures this deterioration can be expected in even shorter storage duration. In order to avoid excess plastic waste, vacuum bags should be resealable. An alternative could be rigid structures. A project in the Kilimandjaro region of Tanzania could provide first results on improved grain storage at farmer's level. So far, there are no ready solutions for good storage from industrialised cooler climates available because proper stored product protection has been an utterly neglected topic for decades due to the comparatively low market value of durables. Climate change, political unrest and increased migration may soon increase demand and market value and we better be prepared.

Keywords: Insects, moisture content, seal, storage, vacuum