Title Effects of pressurized carbon dioxide on controlling *Sitophilus zeamais* (Coleoptera: Curculionidae) and the quality of milled rice

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Citation Journal of Stored Products Research,Volume 45, Issue 3, July 2009, Pages 201-205

Keywords *Sitophilus zeamais*; Milled rice; Carbon dioxide; High pressure

Abstract

Carbon dioxide was applied at atmospheric pressure (1 bar) and under higher pressures (4, 6 and 8 bars) using a specially designed pressure chamber with the intention of killing *Sitophilus zeamais* in milled rice. Pressures of 4, 6 and 8 bars shortened the exposure time required to obtain 99% mortality of all life stages of *S. zeamais* from 148 h at atmospheric pressure to 29, 9.0 and 4.8 h respectively. Adults were the most susceptible stage in all the treatments. Pupae were the most tolerant stage at atmospheric and low pressure (4 bars) but at higher pressure (6 and 8 bars) no difference among immature stages was found. After application of carbon dioxide under pressure, a significant decreasing trend ($P< 0.05$) was observed in water absorption, cooked rice hardness, final viscosity, setback and consistency with prolonged exposure time. High pressure produced more distinctive changes than low pressure. However, panelists could not detect any differences between non-treated and treated rice when sensory qualities were evaluated.