

Title Three-dimensional spatial distribution of adults of *Cryptolestes ferrugineus* (Coleoptera: Laemophloeidae) in stored wheat under different temperatures, moisture contents, and adult densities

Author Fuji Jian, Ron Larson, Digvir S. Jayas and Noel D.G. White

Citation Journal of Stored Products Research, Volume 47, Issue 4, October 2011, Pages 293-305

Keywords Population density; Spatial distribution; Temporal continuity; *Cryptolestes ferrugineus*

Abstract

Spatial and temporal distributions of adults of *Cryptolestes ferrugineus* in stored wheat were determined in a 1.5 t bin of wheat held at 20, 25 and 30 °C and 11%, 13% and 15% grain moisture contents (wet basis). The introduced insect densities were 0.1 (low), 1.0 (medium), and 10.0 (high) adults/kg wheat and the 1.5 t of wheat was sampled at 5 locations with 45 kg in a sample unit (referred to as primary unit, about 15% of the wheat was sampled). At each location, the 45 kg sample unit was separated into three 15 kg vertical layers (referred to as subunits).

Geostatistical analysis showed that: 1) insect numbers at medium or high density and in the vertical direction were better correlated than that at low insect density and in the horizontal direction, respectively; 2) this correlation decreased with increasing grain temperatures; and 3) the temporal continuous property might not exist or there was a weak temporal continuity. Aggregation was the highest at the low insect density and then decreased with the increase of insect density due to a repelling effect amongst adults at high insect density. The normal distribution model was appropriate for the description of the count frequency in 32 out of 36 sampling sets (88.9%) when 15 kg subunit data were used. In addition, adults of *C. ferrugineus* had clumped distribution about 95% of the time and uniform dispersion about 5% of the time. This is the first research illustrating the spatial and temporal distributions of adult *C. ferrugineus* using large sample units and known insect densities.