

Title Evaluation of sampling units and sampling plans for adults of *Cryptolestes ferrugineus* (Coleoptea: 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 334-340

Keywords Density estimation; Insect detection; Size of sample units; Number of sample units; *Cryptolestes ferrugineus*; Storage

Abstract

Development and evaluation of optimum size and number of sample units is required for cost-effective management of stored grain beetles. In this study, we evaluated the sampling parameters and accuracy of insect density detection and estimation, developed the optimum size and number of sample units, and conducted a feasibility study of the insect detection and density estimation. The measured insect densities in 92% of random samples were less than the introduced insect densities and $67.4 \pm 10.8\%$ of random samples did not contain adults when the introduced insect density was 0.1 A/kg (adult/kg). If the random sampling technique was used and 15% of the stored wheat bulk was sampled, 72% of determined means of insect densities of the sampling sets were lower than the introduced insect densities. Increasing the size of sample units did not improve the accuracy of the estimation of insect densities; however, it did considerably increase the probability of insect detection when insect densities were lower than 1.0 A/kg. We recommend at least 7 kg per sample unit for insect detection (especially when insect densities < 0.1 A/kg) and the optimum number of sample units with 15 kg grain per unit should be >24 for a fixed precision of 0.35 when insect densities < 0.1 A/kg. This might be a challenge for grain storage practice. Therefore, using sampling technique to estimate insect densities and detect insects at low insect densities (< 0.1 A/kg) might not be practicable.