

Title Moisture content gradient and ventilation in stored wheat affect movement and distribution of *Oryzaephilus surinamensis* and have implications for pest monitoring

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Abstract

This study was carried out primarily to ascertain whether the movement of *Oryzaephilus surinamensis* and *Sitophilus granarius* from low to high humidity zones occurs in bins of wheat and whether aeration of the grain ($10 \text{ m}^3/\text{h/t}$) affects this movement. The second aim was to ascertain the best placement of insect detection traps under the different conditions. Insects were introduced into the lower half of the grain in the bins and their movement was monitored using traps placed at various depths in the grain. *Sitophilus granarius* did not move through the grain into the top layer regardless of the moisture content, temperature or aeration status of the grain. More *O. surinamensis* were caught in unventilated bins than in ventilated bins. More insects were caught in the ventilated bins containing layers of both dry and wet grain than in the bins containing only dry grain. The spatio-temporal distribution of *O. surinamensis* varied significantly. The depth at which insects were trapped varied between treatments: in ventilated dry grain, most insects were trapped at the surface; in ventilated wet and dry grain, most insects were trapped at 10 cm and 0.75 m; in unventilated wet and dry grain, the vast majority of the insects were trapped at 0.75 m. Very few insects were trapped at 1.75 m regardless of the treatment. The proportions of the initial population of *O. surinamensis* which were recaptured in the top layer of grain varied between treatments. Most were recaptured in the unventilated bins containing wet and dry grain followed by ventilated bins containing wet and dry grain. The smallest proportion of the population was recaptured in the ventilated bins containing only dry grain. Immediate practical implications for pest monitoring based on physical control measures in use are discussed.