Areawide IPM for Commercial Wheat Storage

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Introduction

Insect pest management in grain elevators can be done more effectively and at a lower cost when insects are managed throughout a network of elevators. Areawide IPM is particularly important for stored wheat because insects are moved through the marketing system along with the grain. If insects are not controlled at one location, they can be spread to many other locations, which increases the cost of pest management. A sampling-based program was developed for managing insect pests in upright-concrete grain elevators.

Objectives

1. Develop practical methods for sampling insects in upright concrete elevator bins.
2. Determine the efficacy of current insect control programs in grain elevators.
3. Determine if early aeration can be used to suppress insect population growth in grain bins.
4. Determine if a sampling-based risk analysis program is more cost effective than calendar-based fumigation.
5. To develop decision-support software that provides managers with a risk-analysis report for their facility.

Stored-Grain Ecosystem

Lesser Grain Borer: larvae develop inside the grain kernels

Insect-damaged kernels can cause a major loss in value.

These small parasitic wasps, Theocolax elegans (Pteromalidae), attack beetle larvae developing inside the grain kernel.

SGA Pro Validation

SGA Pro analyzes the insect data, grain temperatures and moisture, and determines which bins need to be fumigated. The risk-analysis program also uses a predictive model based on the grain temperature and moisture for each bin to predict future insect numbers.

Sampling Stored Grain

We compared many different grain-sampling devices. We found that the vacuum probe sampler was the best way to sample stored grain without having to turn it. We used the vacuum probe to take 10, 1-gal grain samples in the top 40 feet of each silo. An inclined sieve was used to find insects in the samples. The insects were identified and counted, and the data was entered into the decision support software, Stored Grain Advisor (SGA) Pro.

Program Accomplishments

♦ A new method was developed that allows insect sampling in +100 foot-tall bins without having to turn the grain.
♦ We developed and validated a decision support tool that can be used by elevator managers for insect problems in stored grain.
♦ Based on data from the last two years, SGA Pro successfully predicted bins at risk (insects) in 527 out of 530 total sampled bins.
♦ SGA Pro can save managers money by only fumigating bins at high risk for insect losses, rather than all bins at the elevator.
♦ The decision support system reduces the frequency of fumigation by only treating the bins that have high insect density, rather than treating all the bins.
♦ Elevators that followed our recommendations after sampling reduced the number of bins they normally fumigated by at least 50%.
♦ A new grain-scouting company was recently started in Kansas that is using SGA Pro and the sampling tools that were developed in this project.

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