

IPM in Stored Product Entomology

Frank Arthur

USDA-ARS

Manhattan, KS 66502

What are “Stored Products”?

- Bulk grains in bins and elevators
- Transportation Industry-railcars, ships
- Milling, processing, and warehouse industry
- Urban environments (stores, homes)

Country Grain Elevator



Food Processing Plant



Flour Mill



Insects in Stored Products

- Internal feeders inside stored raw grains
- Difficult to kill immatures inside the kernel
- External feeders of stored grain
- Insect pests in mills, processing plants, and food warehouses

Lesser grain borer

Rhyzopertha dominica



Rice Weevil

Sitophilus oryzae



Angoumois grain moth

Sitotroga cerealella



Insect Pests: External feeders

- Often considered secondary pests
- Red flour beetle, sawtoothed grain beetle, rusty grain beetle
- Immature beetles vulnerable, easy to kill compared to the primary pests

Red flour beetle

Tribolium castaneum



Rusty grain beetle

Cryptolestes ferrugineous



Cereal Research Centre

Sawtoothed grain beetle

Oryzaephilus surinamenis



Indian meal moth (IMM)

Plodia interpunctella



Integrated Pest Management (IPM)

- Concept developed for field crops
- Define an Economic Injury Level (EIJ), then set a lower Economic Threshold (ET)
- Extensively sample for insects to monitor populations
- Apply insecticides only when ET is exceeded

Barriers to IPM in Stored Grain

- Large vertical 3-D storage structures make it difficult to sample effectively
- Hazardous environments for sampling
- Low value in storage system often eliminates paying scouts or consultants for sampling
- Regardless, there is room for improvement

Barriers to IPM in Processed Food

- Zero tolerance for insects
- Distribution chain from manufacturer to consumer is extensive, with many different sites for infestations to occur
- Impact of consumers regarding potential legal issues from pest infestation

IPM Programs for Stored Products

- Components of IPM programs in stored products are similar to those in other systems
- Sampling and monitoring are still employed as a means to reduce insecticide use
- Reduced-risk insecticides and other alternative controls are being emphasized
- Research on IPM system approaches

Symposium Topics

- Phermones for monitoring and control
- Sampling programs for bulk grain
- Insect growth regulators (IGRs) as part of control programs
- IPM in food processing