STORED GRAIN PEST MANAGEMENT: TRENDS AND NEW TECHNOLOGY

Jerry Heath
Fumigation Remains an Essential Tool for Food Processing and Commodities

- Nothing else is so versatile for reaching into harborages of equipment, structures, or grain kernels.
- Fewer fumigations than previously
  - Methyl bromide phase-out and less versatile alternatives.
  - Expense of fumigations and down time.
Great Success with more diversified IPM

- Bar code software facilitates pest management data analysis, mapping, identifying hot spots & communications. Harborages located and eliminated.

- Aerosol foggings with Vapona and Insect Growth Regulators (IGR’s) are doing the job at lower expense and less plant downtime.
Bar coding on devices and software helps analyze pests and areas of activity
Software further helps focus on a problem area on a map.
Data analysis for rodent activity at a specific location

Location Pest Activity For 016 Under Steel Tanks Back End
Between 1 JAN 2010 and 31 DEC 2010

Mouse Trap @ 016
Selected Pest House Mouse

[Bar chart showing monthly pest activity]
Case study: Cereal

- Integrated program:
  - Well-designed plant
  - Pheromone monitoring added in stages
  - Focus on finding sources
    - Use of maps to help sanitation crew
    - Increased inspection by IFC & client
  - IGRs – provide residual coverage
Modern Pest Mgmt. for Food Processing Industry

• Much more than chemical applications!
• Data driven; Documentation; Coordination of relevant tasks with clients; Pest mgmt. communications between different plants and corporate mgmt.

• Motivated by
  1. Protecting the brand
  2. Food industry-imposed standards: Global Food Safety Initiative and audit standards. Some East Africa companies are already benefitting from meeting standards. Others have lost opportunities!
Case study: Cereal

• Results:
  • 10 more production days
  • No general fumigation
  • Fewer “contact” foggings
  • Reduced insect counts
  • Cost savings to client
  • More consistent revenue for IFC
Another tool that is reducing fumigations

Pheromone Mating Disruption of Indian Meal Moth

Cidetrak® IMM

- Season long control for a cost similar to 1 fogging!
- Non-toxic.
Mating Disruption Dispenser Strips

- Technology is widely used outdoors for certain orchard pests.
- Lasts about 6 months.
- Nine clusters of about 4 strips would treat about 250,000 cu. ft. (6944 cubic meters).
- Non toxic! Limited use for Indian Meal Moth and related species.
Pheromone Mating Disruption
Performing Better than Traditional Methods!
Trends in Phosphine Fumigation

- Liabilities with solid formulations:
  - Failure to completely react; re-start when disturbed.
  - Fire hazards.
  - Deactivation and waste disposal issues.
- Appeal of cylinderized formulations:
  - Precise, instant concentrations.
  - Faster and able to add gas.
  - No waste; No fire hazard.

**But greater product cost, equipment and logistic expense.**
EcoFume treatment of a flour railcar using a convenient “Dosing Cylinder”
Increasing use of grain protectants rather than fumigating with phosphine

- Especially an IGR, methoprene, in “Diacon IGR Concentrate”.
- Protecting wheat 2 years+ very economically from Lesser Grain Borer and most others. *Weevils escape.*
- *In the US can be applied directly to grain, spices, animal feeds, and any raw commodity.*
- *Must be sprayed to coat grain...*
IGR treatment system for grain at a flour mill
38 x 30,000 bu. high turnover bins adjoining flour mill

- Program began in 2006 with installation of a treatment system.
- Intermittent use; Focus on bin bottoms that rarely empty.
- Occasionally turn and treat 30K bu. that gets re-directed to misc. bin bottoms.
Other Protectants and Residuals for Storages

- **Protectants for Applic. to grain**
  - Malathion, OP, resistance – not recommended.
  - Diatomaceous Earth, natural dry dessicant.
  - Chlorpyriphos methyl, OP.
  - Deltamethrin, Syn Py.
  - Methoprene, IGR. Spray or dry grit forms.
  - Pirimiphos methyl (Actellic), OP
  - Spinosad, (new) spinosan

- **Additional residuals for empty storages and facilities**
  - Cypermethrin, syn py.
  - Cyfluthrin, syn py.
  - Esfenvalerate, syn py.
Insect Resistance to PH$_3$ getting attention worldwide

- Field populations found in US 3000X more tolerant than susceptible lab cultures.
- Requirements on US PH$_3$ labels for efficacy monitoring…
  - Alternative fumigant (sufuryl fluoride) to stagger with PH$_3$ being promoted as resistance mgmt. tool.
Resistance Development and Mgmt.

- Stress factors (insecticides) select the strongest organisms to survive and reproduce. Populations become resistant.
- One of the techniques for managing resistance to pesticides is to keep populations off balance with multiple or alternating modes of action.
Insecticide Modes of Action

> Nervous System
  - Processes in the nerve fiber
  - Processes at the synapse
> Protoplasms Poisons
> Energy Blockers
> Hormone Mimics (IGR’s)
> Pheromones
> Physical Toxicants and Dessicants
> Metabolic Inhibitors
> Gut Disruptors
> Sometimes M.O.A. is not fully understood.
Chemical Classes and Nervous System Modes of Action

- Fiproles
- Pyrethroids
- Acetylcholine esterase
- OPs & carbamates
- Neonicotinoid
- Spinosyn
- Na+, K+, Cl- Channels
- Acetylcholine vesicles
- Acetylcholine receptors
- Presynapse
- Synapse
- Postsynapse
How do you manage rodent pests?

• Standard bait for many years has been anticoagulant parafin/grain blocks.
• New soft bait formulations now offered for most of the popular active ingredients: Dough-like consistency is more palatable, thus more attractive at facilities with abundant food.
QUESTIONS OR DISCUSSION?

Thanks for your attention!
Perhaps we will meet again.