



# Integrated Pest Management and Fumigation Safety Training

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# Introduction to the concepts of Integrated Pest Management (IPM)

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## IPM definition and history

- Utilizing all available tools and techniques for sustainable pest management.
- Concepts first developed in agriculture in response to over-reliance on pesticides and negative consequences.
- “Pest mgmt.” recognizes a certain level of tolerance.
- Pesticides remain an important tool.



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# Integrating tactics based on knowledge about threats

- Foundation is identification and understanding pests.
- Limit your concern to real threats.
- Knowledge about key threats provides insight on mgmt tools you can bring to bear.
- Excellent ID aids will be provided!



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# About 50 key pests worldwide, plus susceptibility to others. Commodities and location will often dictate.

Commodity	Key threats	Secondary threats	Location factors
Dry beans, pulses	Bruchid weevils. Rodents		Roof rats in tropics
Whole grains, rice maize	Rice & Maize weevils lesser and larger grain borers. Rodents	Milled product pest complex. “	Larger grain borer esp. in Africa.
Milled grains, flour	Flour beetles and others in milled product pest complex. Rodents		
Corn Soy Blend	Dermeistid beetles.	Milled product pest complex.	



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## Key pest & commodity associations, cont.

- Milled Product Pest Complex: Large, diverse group – flour beetles, fungus feeding beetles, grain debris feeding beetles and moths, moisture problem indicators...
- Many of these insects indicate an environmental condition or deteriorating product quality.
- More specific information in presentations on monitoring, and vertebrate pest mgmt.



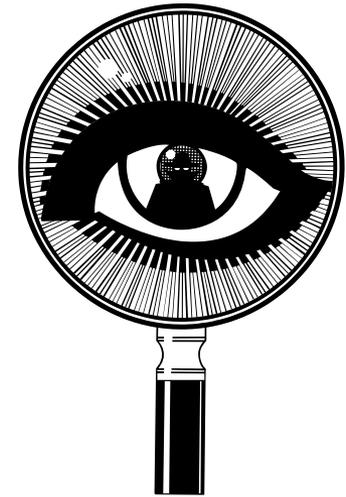
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# Identifying tiny stored product insects requires magnification and good lighting

- An inexpensive hand lens can be adequate.
- About 15 X loupe is an excellent choice.
- Hold lens close to your eye and bring specimen close into focus. Operate in the brightest light possible.
- Reference collection being provided will be a huge help!



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## Sanitation

- Depriving pests of what they need to the extent possible: food, water, *harborage* and favorable environments.
- Scheduling certain sanitation operations on a schedule to break developmental cycles. Many stored product insects develop in about 30 days.
- Sanitation both indoors and out!
- Good housekeeping in a warehouse accomplishes much of this.



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## Sanitation, cont.

- First in / First out
- Clutter = harborage and breeding areas for many pests.
- Broken bags and spillage will be high risk areas.
- Segregate products as necessary. Beware of importing infestations.



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## Inspection, cont.

- Objective is to:
  - intercept infested cargoes that can be managed before entire warehouse becomes infested;
  - Identify conditions that can be corrected before problems develop;
  - identify localized pest activity that can managed before spreading.
- Single best tool for inspection is a good flashlight!



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## Inspection

- Try to intercept infestations being shipped in. Inspect arriving cargoes: signs of rodents or insect activity on packages or interior of shipping containers or trucks.
- Periodically inspect warehouse stores: Sample bag seams, look under stacks for insects or signs of activity.
- Inspect for broken bags, spillage.
- Inspect for conducive conditions for pest activity: clutter, structural defects that could be harborages, exclusion deficiencies, leaks, standing water.



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## Trapping and Monitoring

- Trapping is a control technique for certain pests (especially rodents).
- Trapping also supplements inspections for early detection and monitoring of pest populations.
- Map your trapping device and rodent baiting locations.
- Always count and ID as best as possible!
- *The essence of monitoring is the analysis of data over time.*



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# Monitoring

- Monitoring proves your program is effective.
- Or, points to problem areas where vigilance or corrective action is needed.
- Analysis can be done with a simple spreadsheet or wall chart.



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## Exclusion

- Tropical buildings are open to the environment!
- Exclude what you can, especially rodents and birds. Mice can enter through ¼ inch (5 mm); rats ½ inch (1 cm). Screen birds from entering through vents.
- Keep doors closed as much as possible. Consider step-over rodent guard panels for doors that stand open for some deterrence.
- Rodents can enter from below ground to the rooftop. Keep exclusion measures in good repair.



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# Exclusion



- This African corn flour packaging area had a flock of sparrows in the rafters.
- Bird droppings have been linked to many human pathogens, and a number of sensational food safety regulatory actions.



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## Exclusion

- Insect screening requirements for stored product insects may be too fine to be practical.
- Consider residual insecticide treatments to discourage invaders.



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## Design and Physical Controls

- You have criteria for ideal warehouses, but what's available may be a compromise.
- Allow adequate space for alleys and between stacks.
- Do the best you can to have well-lighted warehouse spaces (discourage rodents),
- Good ventilation and air movement including supplemental fans will promote a dry storage environment and discourage certain insects.



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## Pesticides

- Ideally a very small but important capstone on the IPM Pyramid.
- When management options are limited pesticide use becomes a bigger part of the program.
- Pesticide technology closely related to medicine and pharmaceuticals in history.
- “Life science” companies seek biological activity. Very few compounds make it to full commercial development as pharmaceuticals or pesticides.



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# The pesticide modern era began with DDT in WWII

- We have almost forgotten dread diseases of the past like typhus.
- DDT was a miraculous discovery. Inventor received a Nobel prize. But resistance developed quickly.
- Bio-accumulation was a problem.
- There has been a progression in pesticide technology.
- Some pesticides still have significant medical use and benefits.



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Too much reliance on DDT and other pesticides taught us there are no “silver bullets”. Pest management requires realistic expectations and an integrated program with all available tools and techniques.



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Thank you for your attention.



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