Insect Growth Regulators and Pheromone Mating Disruption

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IPM in Stored Products and Innovation in Alternatives

Monterrey, Mexico

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The Industrial Fumigant Co. (IFC)
Lenexa,KS

- **75 years in business; About 25th largest pest control company in U.S.**
- **Focus on commodity and food processing industries.**

- **Evolved: formulation and product sales …fumigation service…comprehensive IPM products and services.**
- **Joined Rollins Inc. in 2005.**

As an industry we have been through some interesting times!

- "Profume is the answer!"
  "Heat is the answer!"
  "Defend bromide to the end!"
- Food processors need tools so they joined in…
- *But really, food processors would rather not fumigate.*

Down time is too costly

Jim Bair, North American Millers Assn. –

“ A typical flour mill needs to run 5 ½ or 6 days out of a week to cover expenses. Only 1 or 1 ½ days remain to make some profit. Any time down for maintenance, sanitation or pest control is a loss that cannot be recovered.”

Efforts Began in Earnest 8-10 Years Ago to Manage With Fewer Fumigations and/or Less Down Time

- Pyrethrin and Vapona space treatments.
- Insect Growth Regulator (IGR) space treatments.
- Improved monitoring analytical tools.
- Improved sanitation & maintenance.

Vapona (aka Dichlorvos)

- Difficult chemical to formulate and hard on equipment. Solvent 1,1,1-trichlorethane had air quality issues and products were lost.
- Evidence of carcinogenicity had to be rebutted.
- Stigma of being an organophosphate.
- Endured over 20 years of regulatory reviews! Future seems secure for several products.

Insect Growth Regulators: Juvenile Hormone Mimics

- Disrupt molting and reproductive development.
- Excellent environmental and toxicology characteristics.
- Versatile application options.

  hydroprene – Gentrol products. Volatile.

  pyriproxyfen – NyGuard and others.

  Non-volatile and stable in sunlight.

  methoprene – Diacon IGR. Grain protectant and versatile other uses.

  Exempt from tolerance!

Differential Efficacy of IGR's Against SPP's

- Imperfect data. Much higher dosages than would be used in the field.
- Still worthwhile as an indicator.

IGR Effects on Pupation
Use either or

		Hydroprene (Gentrol)		Methoprene (Diacon)	
		5 ppm	10 ppm	5 ppm	10 ppm
Lepidoptera	*Almond moth*	100	100	93	100
	Indian meal moth	100	100	100	100
	Rice moth	100	100	82	100
Coleoptera	*Red flour beetle*	100	100	100	100
	Warehouse beetle	100	100	0	13
	Lessor grain borer	98	100	98	100
	Confused flour beetle	90	93	100	100
	Granary weevil	72	92	0	22
	Rice weevil	68	94	0	7
	Cigarette beetle	23	25	100	100
	Sawtoothed grain beetle	17	54	100	100

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Residual Performance

- As a grain protectant 1.25 – 1.4 ppm methoprene is protecting wheat for 2 years in the face of heavy lesser grain borer pressure!
- Frank Arthur, USDA Stored Products Lab, Manhattan, KS has found 10+ weeks residual efficacy of space treatment pyriproxyfen deposits on concrete against red flour beetles.

Coincidental with new IGR product launches

Pest Management Software Development

- Gentrol (hydroprene) had been on the market for years. Sales hit a plateau. Never much customer satisfaction. Constant educational challenge.
- Pest mgmt. software enabled easier trend analysis and demonstrated the value of IGR's.
- In-Quiz-It Software "U-Trap-It" is one of the better programs.

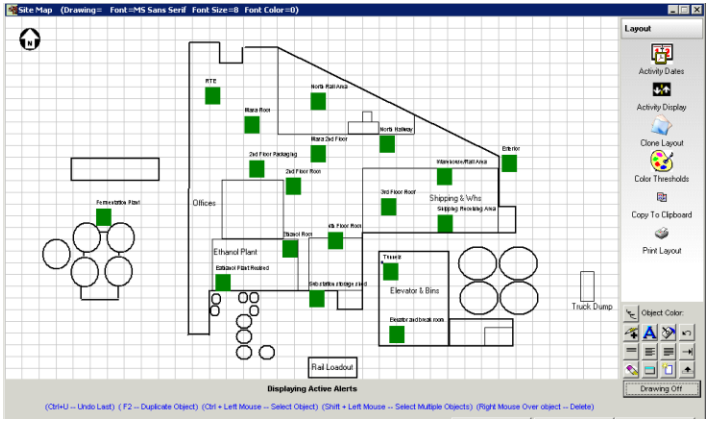
Maps, Graphs and Almost Any Kind of Report

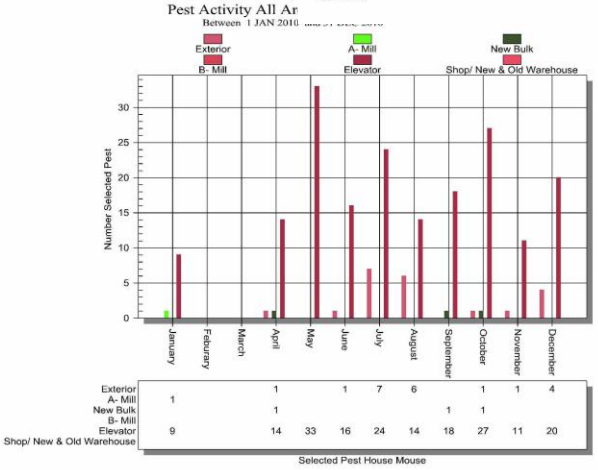
ADM Camp Hill
811 Spangler Rd
Camp Hill, PA 17011

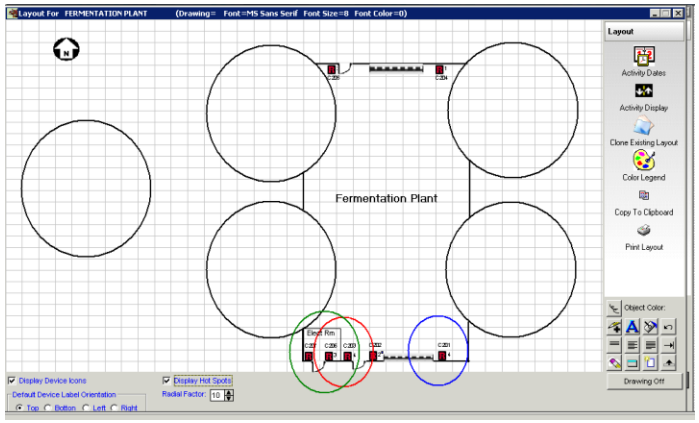
Pest Activity Summary

From: JAN 1,2010 To: DEC 31,2010

Pest Description	Total Found
ARGENTINE ANT	0
Ants	7
Cigarette Beetle	2
Common Flyers	20,385
Deer Mouse	7
Flat Grain Beetle	16
Flour Beetle	2,209
House Fly	831
House Mouse	211
Indian Meal Moth	70
Mediterranean Flour Moth	6
Sawtooth Grain Beetle	1
Stink Bug	18
Vole	1
Warehouse Beetle	490
Yellow Jacket	1







"Quality Protection for the Food & Commodity Industries" ™

No silver bullets, but better ***integration*** of multiple pest mgmt tools and techniques!

- Very large, diverse, successful territory.
- Has not done a general fumigation in 4 or 5 years!
- Excellent monitoring, IGR and some Vapona space treatments, Perimeter residual treatments.
- ***People skills*** to achieve sanitation improvements and harborage elimination.

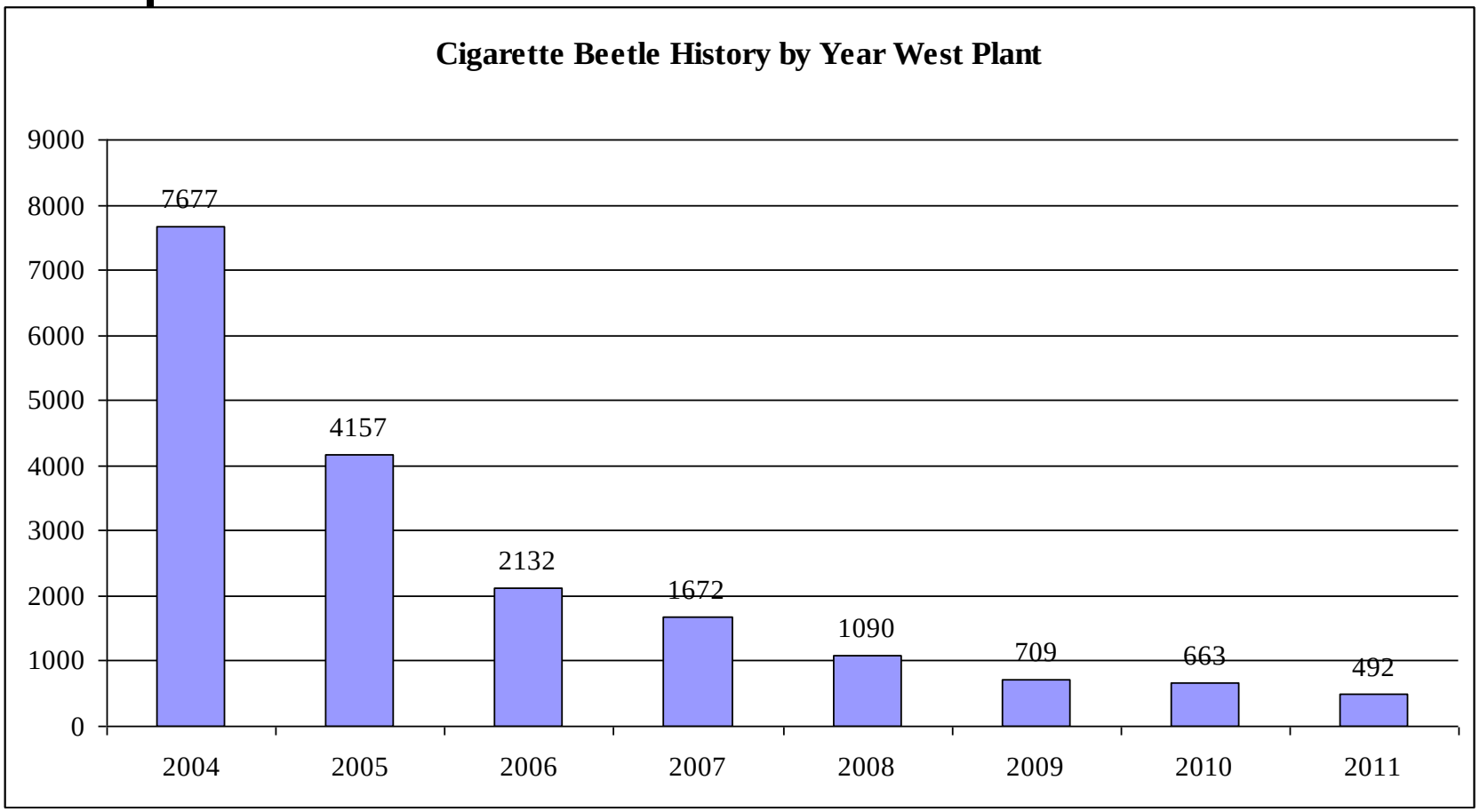
Case study: Cereal Plant

- One general fumigation / year
  - 3 days downtime
- Four heatups
  - 3 days downtime / heatup
- Three vapona & Aerotech foggings
- Monitoring?
- Goal: Give production days back

Case study: Cereal Plant

- 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

Case study: Cereal Plant



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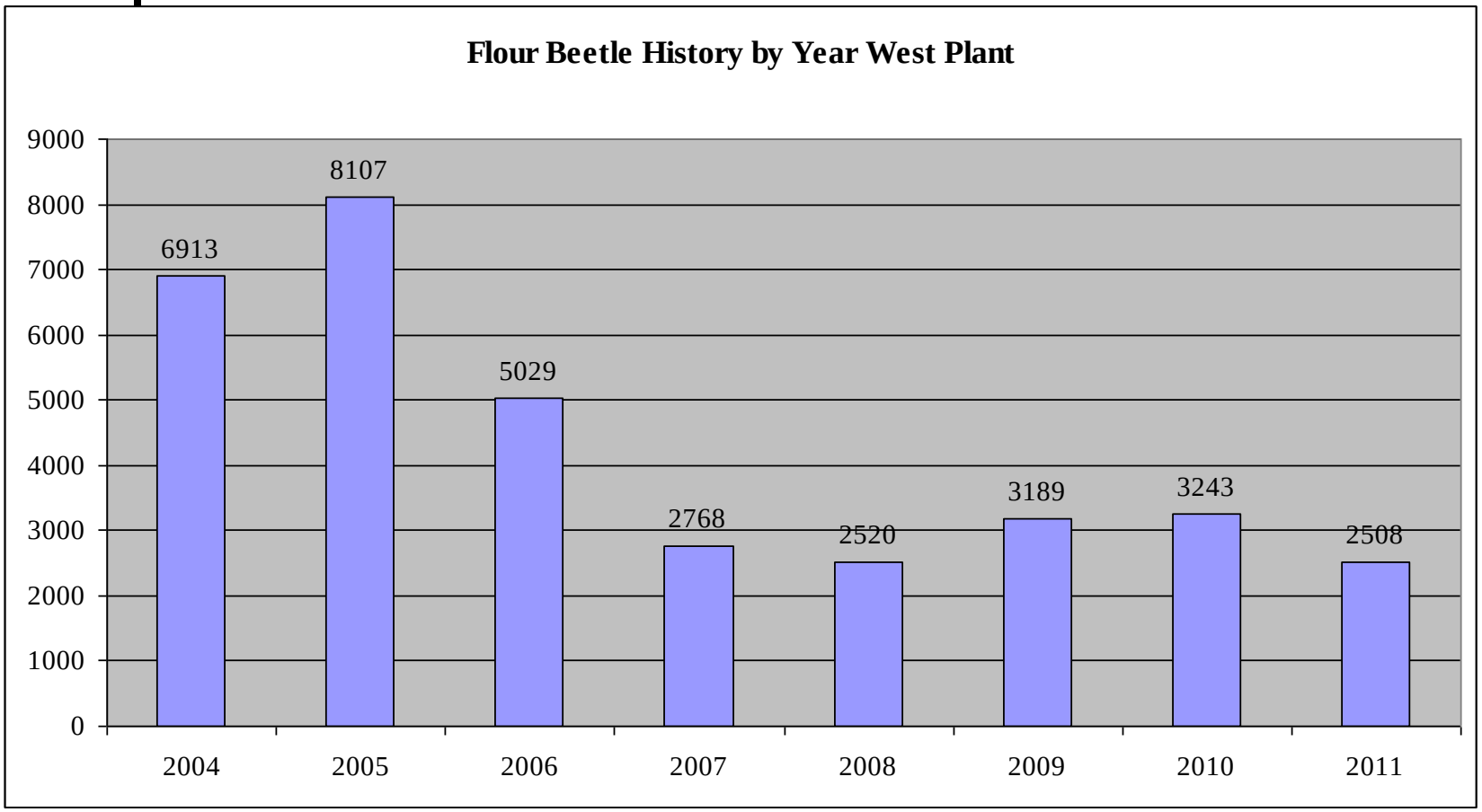


Case study: Cereal Plant

- Results:
  - 10 more production days
  - No general fumigation
  - Fewer “contact” foggings
  - Reduced insect counts
  - Cost savings to client
  - More consistent service revenue.

Treatment strategies

- IGRs must be *part* of the program: IPM!
  - Pheromone monitoring
  - Documentation & Sanitation
- Choose the best IGR for the target pest
- Apply “whether you need to or not” – still IPM!
- Don’t wait for activity: proactive
- Use adulticides to knock down existing populations
- More precise placement necessary with Diacon II or Nyguard
- Why are we fogging?
- Root cause or symptom?

Another innovation in pest management: Pheromone Mating Disruption of Indian Meal Moth (+4)

- **Stimulus overload for males.**
- **Delays or prevents finding mates.**
- **Claims control, therefore “Pesticide”.**

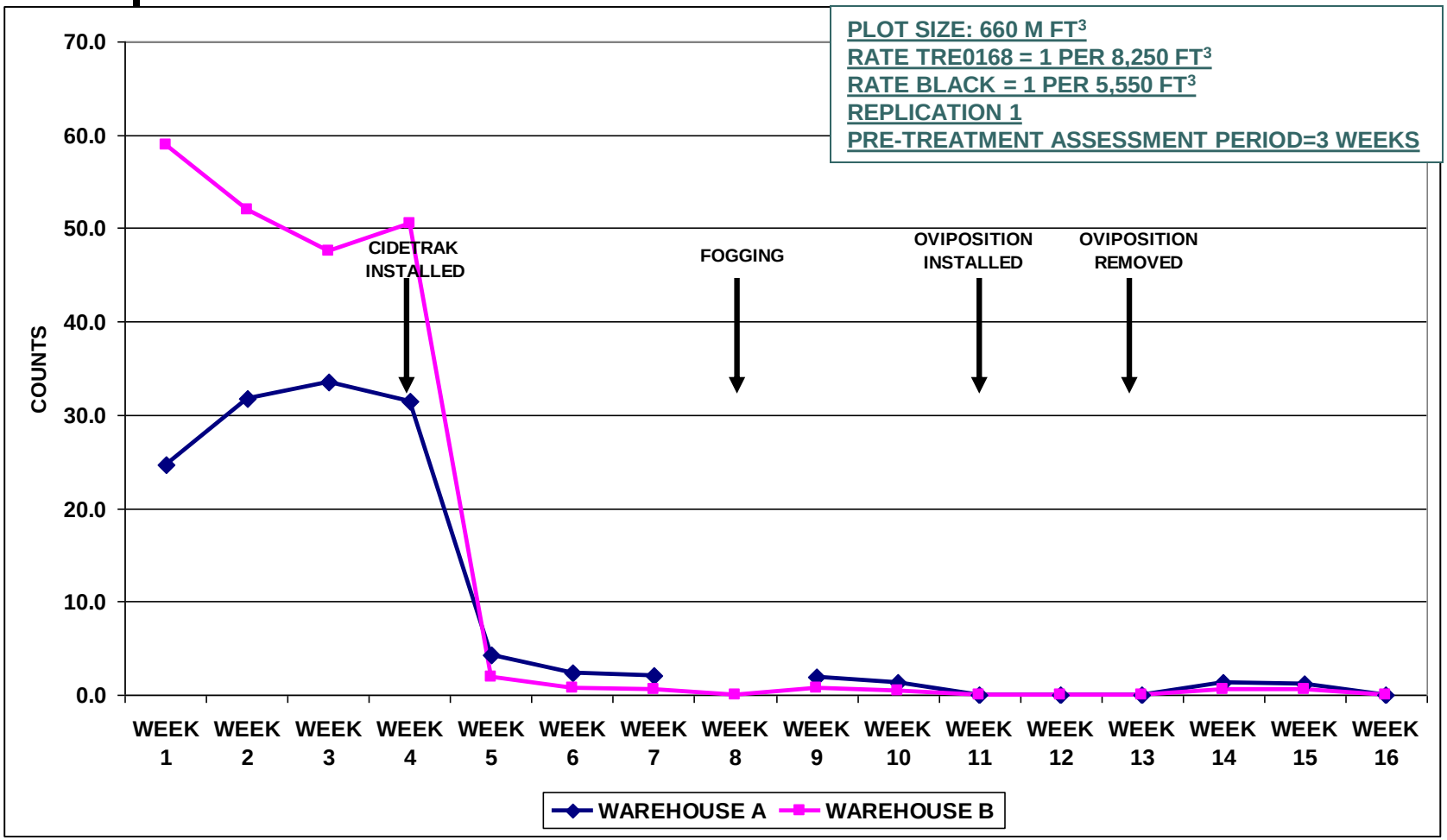
Excellent Performance Under Less than Ideal Circumstances

- Mating disruption has been installed at the peak of the season under high moth pressure. (Better to be placed prior to population growth.)
- Grid placement patterns have been less than ideal.
- Great performance virtually every place mating disruption has been installed: Grain elevators, bin head spaces, imported commodity warehouses. nut processing, mills, grocery distribution centers.

Ideal Habitat for Moths

Coffee Bean Warehouse

Houston, TX



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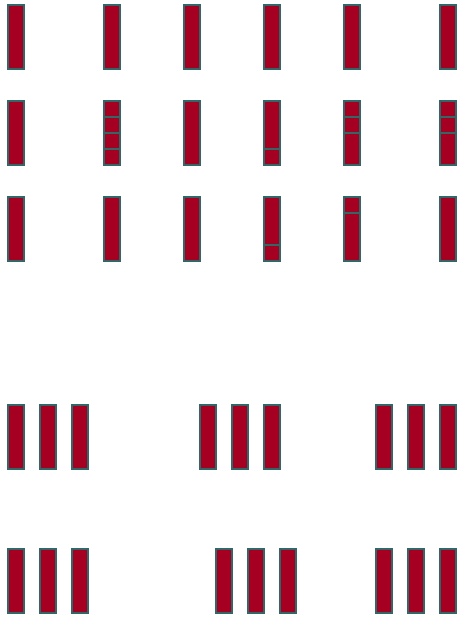
The Real World is Rarely Ideal

- **Sometimes a neat grid placement is not feasible.**
- **Grids of clusters have worked fine.**
- **Cidetrak @ 1/7000 cubic ft. suggested.**

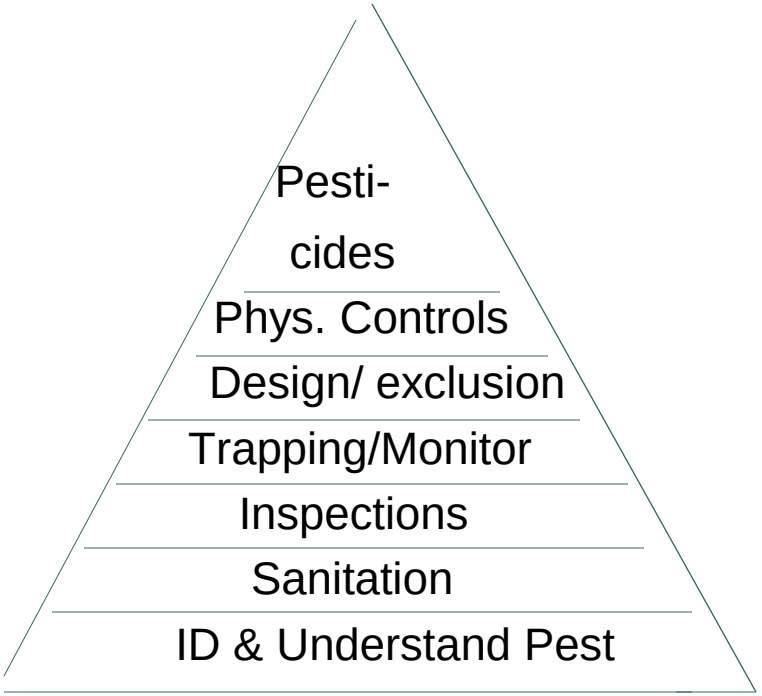


Approximate Costs of Treatments
(materials only)

Treatment	$ per 1,000 cubic ft.	Duration
Pyrethrin 3% Fogging	.83	None
Pyrethrin 1% Fogging	.81	None
IGR Fogging	.06 - .90	60 days+
Vapona 5% Fogging	.41	None
Fumigation (PH3)	9.70	None
CIDETRAK®IMM	.72	150 days+

Integrating Tools and Techniques.
Exciting times to be in food processing pest management

- More elements to manage than almost any other system!
- Sophisticated tools.
- Biorational IGR's & pheromone mating disruption.
- Products that are non-toxic, exempt from tolerance, economical and effective!



Thanks for your attention.

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