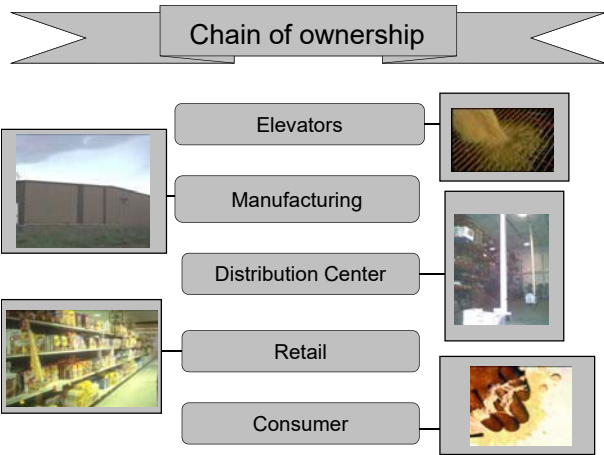


If You Build *it* Right, They Won't Come – Pest Prevention and Monitoring



If you can't sell entomophagy – try improving pest prevention

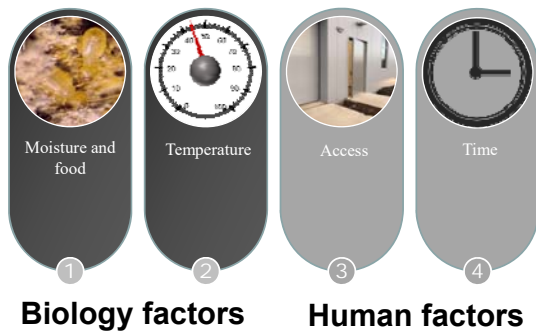




Multiple Species Complex



Regulating Factors













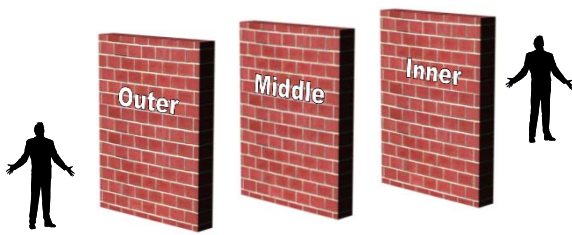
Drainage Issues

**Weeds
Drainage
Standing water**

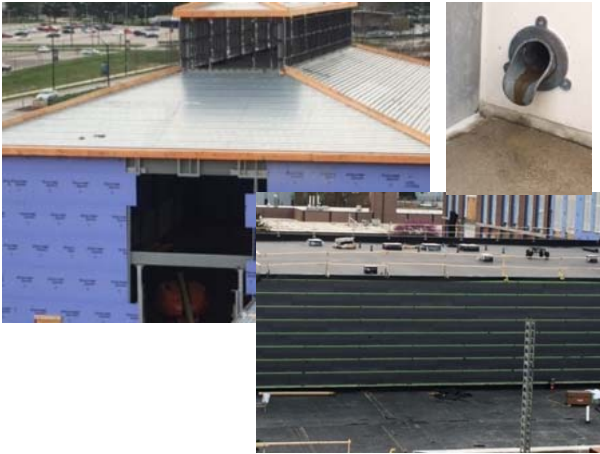




Walls















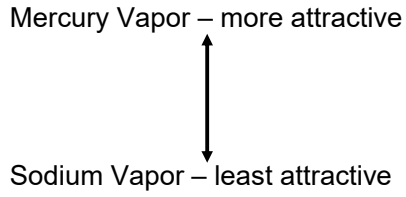








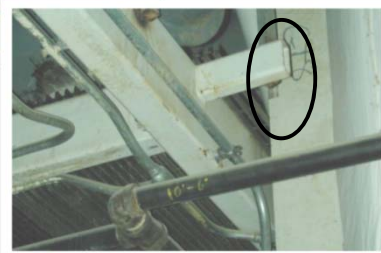
Competing light sources



























Metals in mandibles of stored product insects: do zinc and manganese enhance the ability of larvae to infest seeds? Morgan et al. 2003 JSPR Vol 39

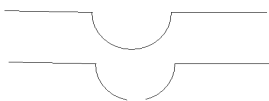
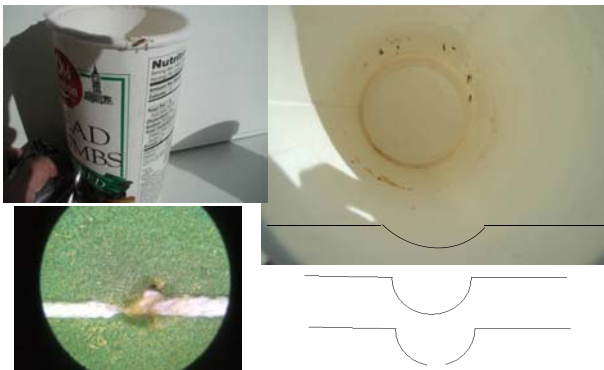


Penetrators



- Lesser grain borer
- Cadelle
- Cigarette beetle
- Drugstore beetle
- Warehouse beetle
- Red flour beetle

- Indianmeal moth larvae
- Almond moth larvae
- Rice moth
- Hide beetle
- Rice weevil
- Confused flour beetle

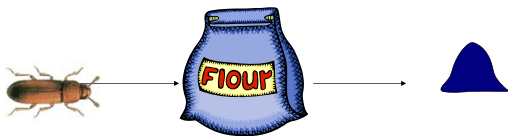


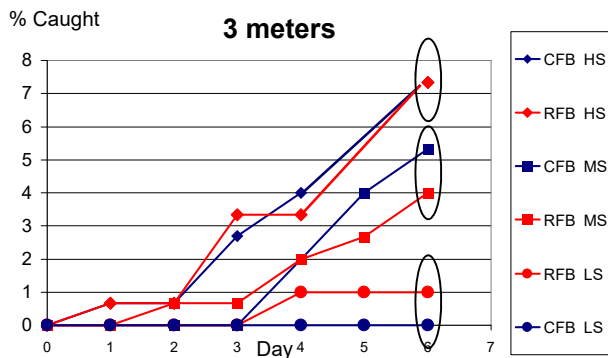
Sanitation

Sanitation IS pest control
Think insect clean not people clean



How does sanitation level influence trap response?





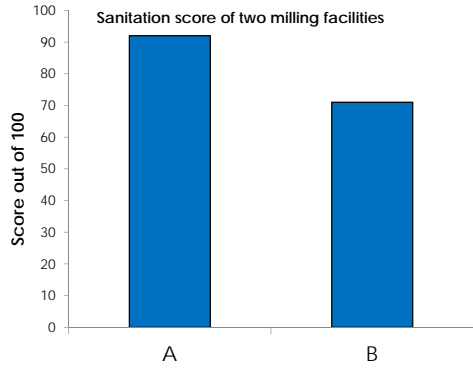
Sanitation – Post Treatment Monitoring

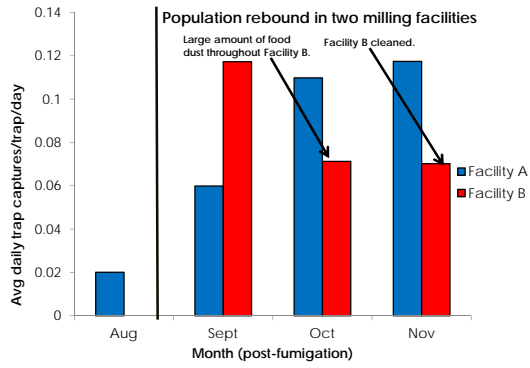
Determine the influence of the fumigant on insect population dynamics post fumigation



RFB Rebound

Fumigant ¹	Mill	Season ²	Fumigation Date	Type	Daily average capture	R ²	Rebound Time
SF	A	Spring	06/17/06	Exponential	$0.4091e^{0.29351x}$	0.9315	3-4 mo.
SF	A	Spring	06/16/07	Exponential	$0.4091e^{0.2931x}$	*	4-5 mo.
SF	B	Summer	09/09/05	N/A	N/A	N/A	N/A
SF	B	Summer	09/15/06	Exponential	$0.4066e^{0.3012x}$	0.7707	4-5 mo.
MB	C	Spring	04/14/06	Exponential	$0.3593e^{0.4374x}$	0.9391	2-3 mo.
MB	C	Summer	06/30/06	Exponential	$0.4213e^{0.4409x}$	0.9196	3-4 mo.
MB	C	Fall	10/27/06	Exponential	$0.4228e^{0.4409x}$	0.9840	8-9 mo.
MB	C	Spring	05/12/07	Linear	$2.3092x - 3.2332$	0.9246	2-3 mo.
SF	C	Summer	08/25/07	Exponential	$0.4213e^{0.4101x}$	*	6-7 mo.
MB	D	Spring	05/12/06	Linear	$1.9546x - 2.1821$	0.5478	9-10 mo.
SF	D	Fall	09/22/06	Exponential	$0.2097e^{0.4580x}$	0.7255	5-6 mo.
SF	D	Spring	05/18/07	Linear	$4.1651x - 4.5565$	0.9486	6-7 mo.
SF	D	Summer	08/17/07	Exponential	$0.2097e^{0.5020x}$	*	7-8 mo.



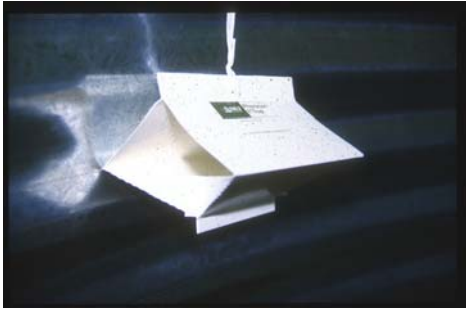


Biomonitoring

What life stage is attracted?
What about gender?



Pheromone trapping



Years of testing to arrive at blend





Estimates of Doses to Kill Phosphine Susceptible and Resistant **LGBs** in 3d

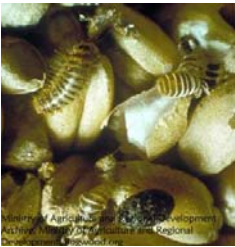
Sample	Dose (ppm) to kill 99%
Susceptible-Lab	2.26
Payne 1	572.78
Logan	2054.40
Garfield	3430.80



Approx. 1500x resistant

Khapra Beetle is BACK.....

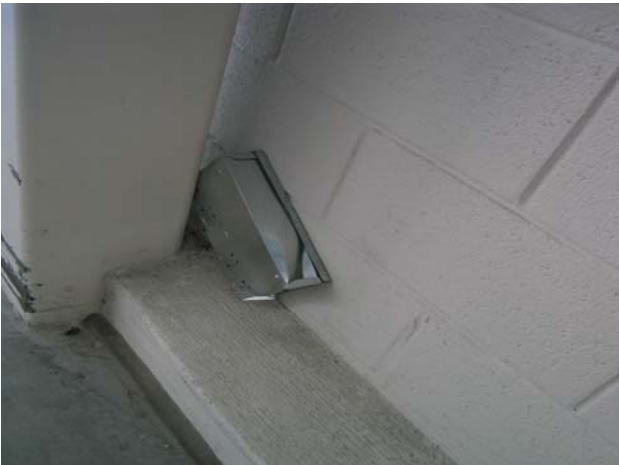
There was a minor outbreak in the U.S. in the 1980s, but the last major infestation in California in 1953 took 13 years and \$15 million to defeat.







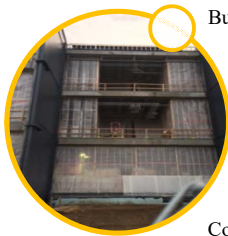








Five Points to Take Home



- Build pest proofing into repair
- Clean to the best level you can
- Monitor to know
- React early
- Consider the total environment
