Trap Captures of Red Flour Beetles Before and After Methyl Bromide and ProFume[™] Fumigations

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Introduction

Tribolium spp. are major stored-product insect pests in food-processing facilities

Tribolium by lifestage



Introduction

Of the Tribolium spp., T. castaneum is the most common species in facilities

- Management tactics
 - Fumigation
 - Methyl bromide (MB), Sulfuryl fluoride (SF)
 - Heat treatment
 - Fogging
 - Crack/crevice or spot treatment
 - Sanitation
 - Exclusion

Introduction

- Insect management challenges and issues
 - Effectiveness of tactics
 Accuracy in estimating insect populations
 Variation of treatment conditions
 Variation in response of insects (stages) to treatments
 Issues with cost comparisons

Experiments

Objectives:

- Evaluate effectiveness of MB and SF fumigation with trapping
- Population rebound after fumigation
- Facilities:
 - 6 rice mills, 3 wheat flour mills
- Fumigation:
 - SF, MB
- Insects: T. castaneum, RFB
- Monitoring:
 - Dome traps: RFB pheromone, inside (30), outside (5)
 - Trapping interval: 13 to 58 days
 - Duration: 07/22/05 to 04/13/07

Storgard[®] DOME[™]

- Integrated components
- Locking mechanism
- Precise to specification
- Reliable, convenient lure holder
- Stackable



Photo, courtesy Donna Lingren, TRECE

Facilities and Treatments

	Α	В	С	D	E	F	G	н	I
Facilities	rice	rice	rice	rice	rice	flour	flour	flour	rice
Fumigants	SF	SF	SF	SF	SF	MB	MB	SF	SF
Fumigation dates	5/28/05 6/26/06 9/7/06	8/5/05 8/19/06	5/20/05 8/11/06	11/11/05 4/15/06 7/4/06	11/11/05 4/15/06 7/4/06	9/3/06	9/3/05 4/16/06 9/2/06	9/15/05 6/24/06	7/13/05
Start and end dates of trapping	5/28/05 4/13/07	7/22/05 4/6/07	5/28/05 4/6/07	10/19/05 1/3/07	10/19/05 1/3/07	7/27/06 12/28/06	8/18/05 1/3/07	9/19/05 6/10/06	9/19/05 10/27/05
No. trapping data sets	31	28	32	5	11	3	9	12	4
Outdoor temperature (°C)	4 - 35	4 - 35	4 - 35	3 - 32	3 - 32	3 - 32	-18 - 28	9 - 28	14 - 29

SF Fumigation



SF Fumigation



Captures Before and After Treatment with SF

Mille	Sitas	Captures (N	lo./trap/wk)	Reduction	Insects caught after trt (d)	
IVIIIIS	SILES	Before	After	(%)		
Rice	А	0.5	0.8	-60.0	17	
	Α	2	0.2	90.0	35	
Rice	В	2.3	0.2	91.3	20	
	В	5.2	0.9	82.7	19	
Rice	С	3.6	0.3	91.7	11	
Rice	D	0.5	0.2	60.0	11	
	D	0.2	0.1	50.0	25	
	D	0.4	0.3	25.0	22	
Rice	E	2.8	0.3	89.3	11	
	E	0.4	0.1	75.0	25	
	E	3.2	0.4	87.5	22	
Flour	н	0.1	0	100.0	66	
Mean ± SE		1.8 ± 0.5	0.3 ± 0.1	82.1 ± 13	23.4 ± 7.0	

Captures Before Fumigation and Trap Catch Reduction and Days to Recapture After SF Fumigation



Relationship Between Trap Captures and Days After SF Fumigation



MB Fumigation



Captures Before and After Treatment with MB

		Captures (Reduction	
Mill	Sites	Before	After	(%)
Flour	F	0.6	0.2	87.5
Flour	G	0.3	0	100
Flour	G	0.4	0	100
Flour	G	0	0.1	NA
Mean		0.6 ± 0.4	0.1 ± 0.05	95.8 ± 4.2

Relationship Between Trap Captures and Days After MB Fumigation



Field Experiment Limitations

- Time (holidays, production schedules)Sampling interval
- Labor
- Space
- Reliability
 - missing traps, treatment information
- Data quality
- On-going monitoring program

Conclusions

- Adults of *T. castaneum* were captured throughout the year
- Adults were captured within 23 days of SF treatment
- Outdooor populations were generally higher than indoor populations. Exclusion practices are important to prevent insect from entry from outdoors, especially after fumigation

Conclusions

- Adults of RFB were captured throughout the year, both inside and outside of the nine food-processing facilities
- The similarity in trends of RFB observed inside and outside of each facility suggests movement between these habitats, and the increased captures outside suggest that exclusion practices are necessary to prevent insect entry, especially after fumigation

- Captures of RFB showed a decrease after fumigation in some facilities and did not show a decrease in others. This does not indicate a treatment failure, but may suggest that traps alone and methods used in this study may not provide a good indication of treatment effectiveness
- Trapping prior to fumigation and trapping at shorter time intervals after fumigation may provide a more reliable estimation of treatment effectiveness

An examination of these data reveal that comparisons of treatment effectiveness with a given fumigant, between fumigants, and among facilities may be confounded by other variables that influence trap captures, such as temperature, degree of insect movement between outdoor and indoor habitats, inbound inspection practices, fogging, crack/crevice treatments, and level of sanitation

Recommendations

- SF and MB treatments should coincide with RFB population dynamics and should not be scheduled on major holidays
- Monitoring populations using more than one method is desirable (traps, tailing, sifting products)
- Monitor insects weekly before and after intervention
- Sanitation and exclusion practices are necessary to extend the degree and duration of insect suppression obtained with any intervention

Thank you