Mechanisms Underlying the Effectiveness of Food Processing IPM Programs

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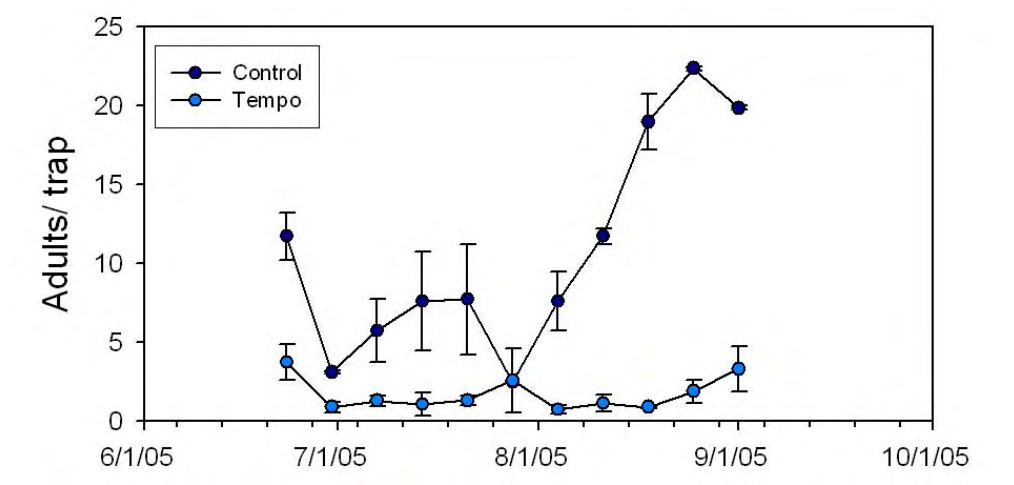
IPM for food processing

- Incoming inspections
- Product rotation
- Periodic fumigation
- Sanitation
- Residual insecticide applications
- Insect monitoring



Stored-product pests actively move among patches of resource in search of food, mates or places to lay eggs

Best opportunities for monitoring

Emigration → Dispersal → Immigration

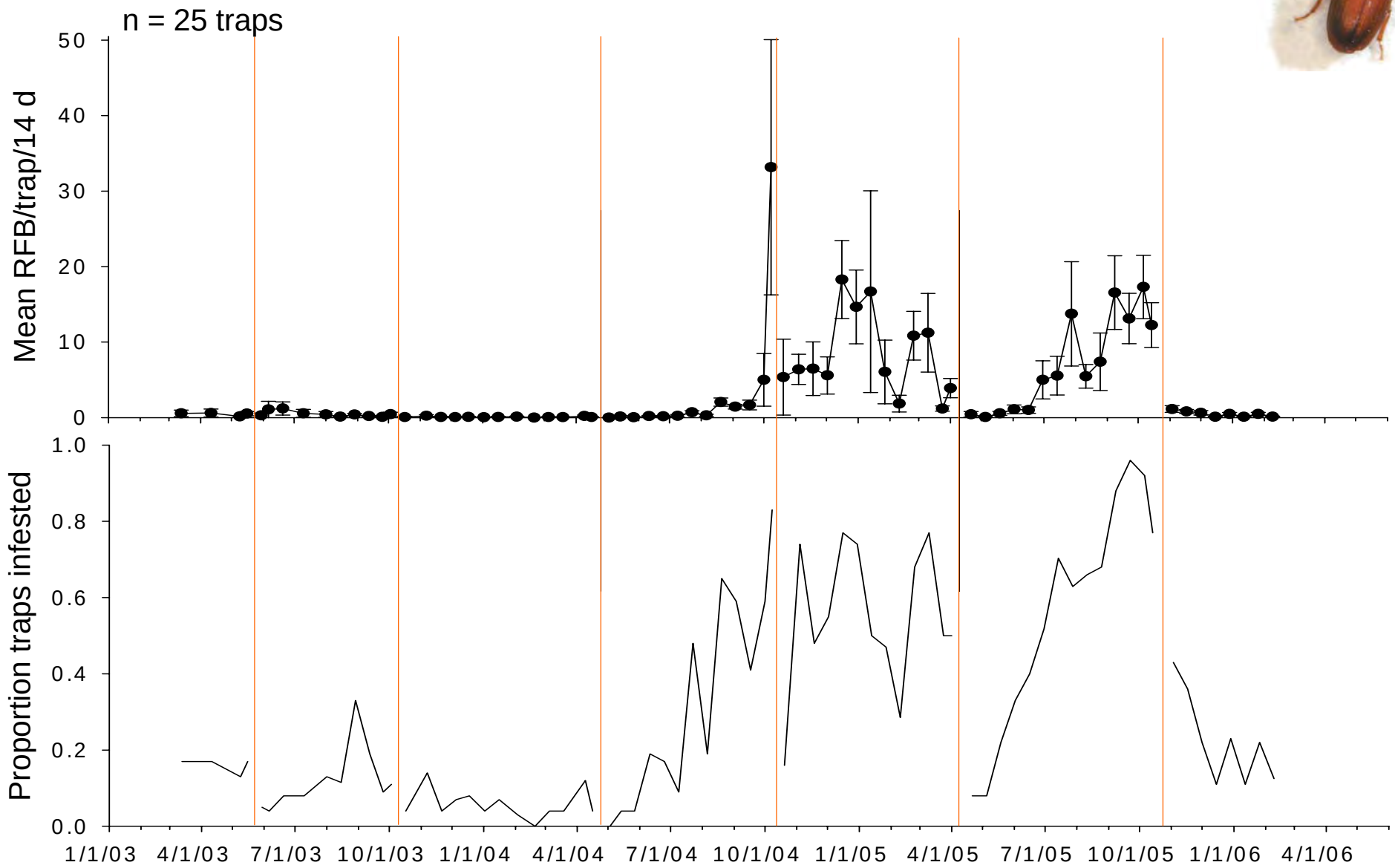
Infested patch

Uninfested patch

Research questions

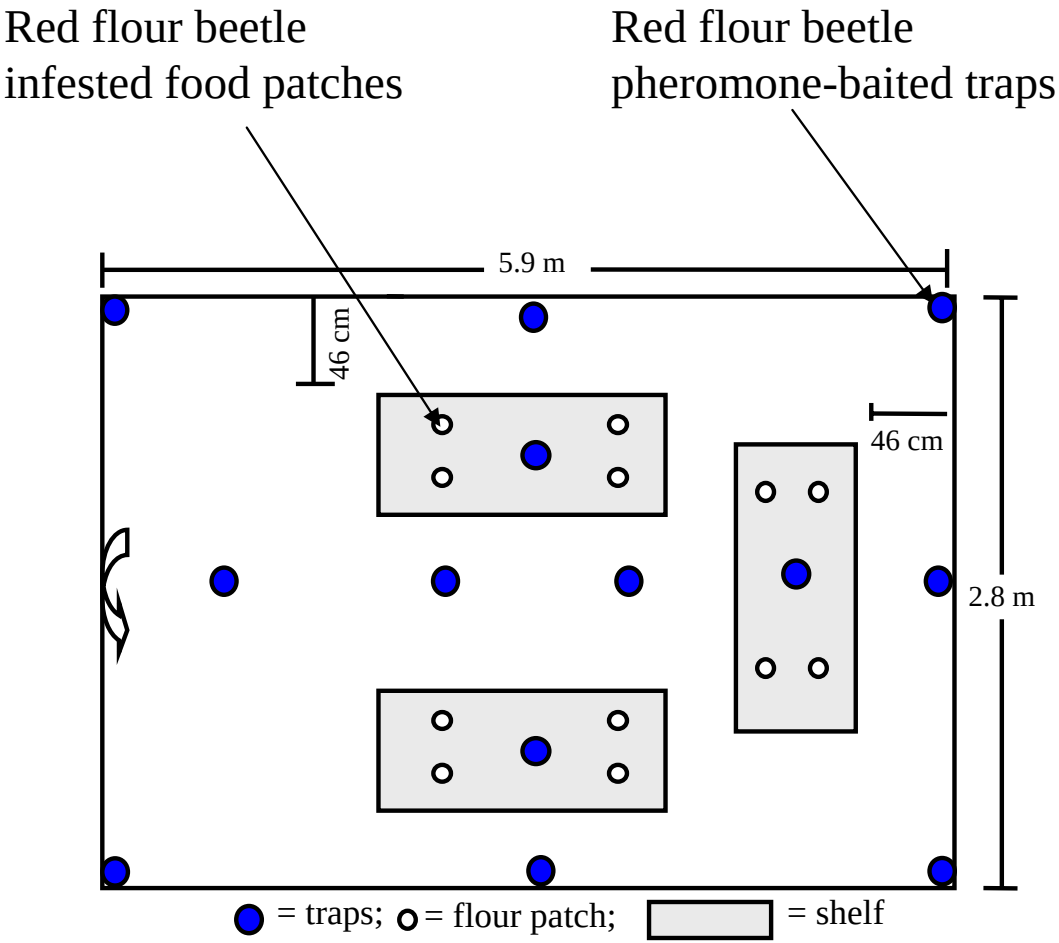
- What influence does sanitation have on insect capture in traps?
- Do insecticide applications affect monitoring ability with pheromone-baited traps?
- Do insect captures in pheromone-baited traps suggest the same trends as direct product samples?

Field data



Red lines indicate fumigation

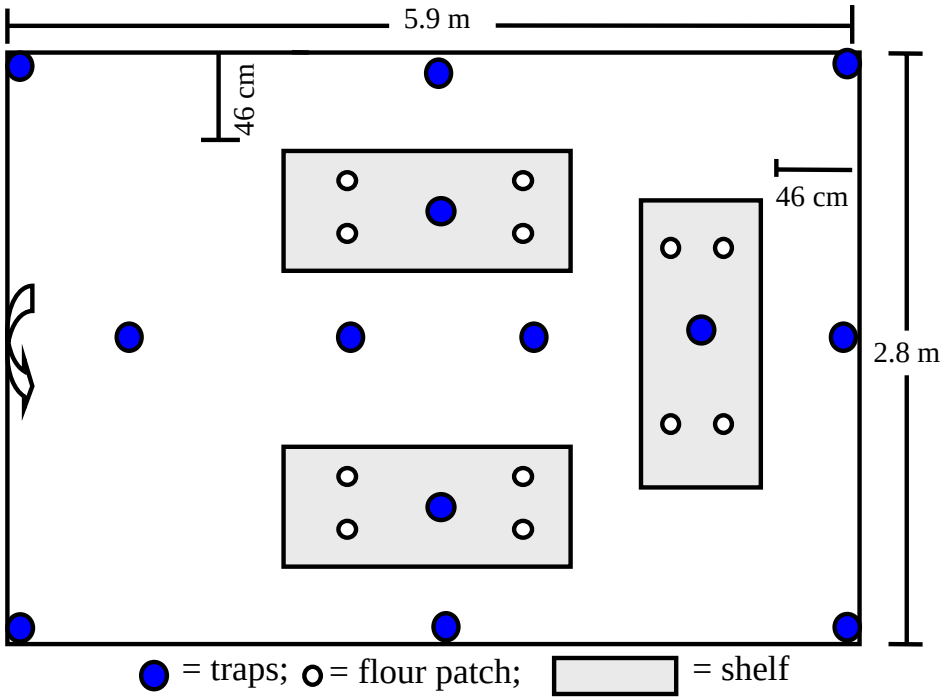
Model system



Types of insect monitoring

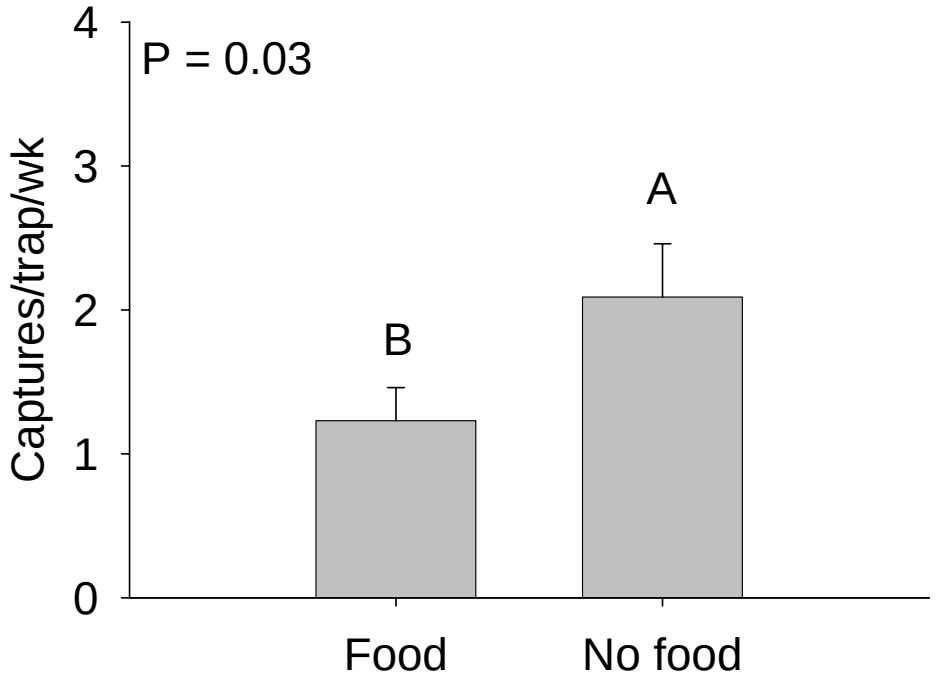
- Pheromone-baited traps
- Direct sampling in food patches
- Collection of dead adults on floor

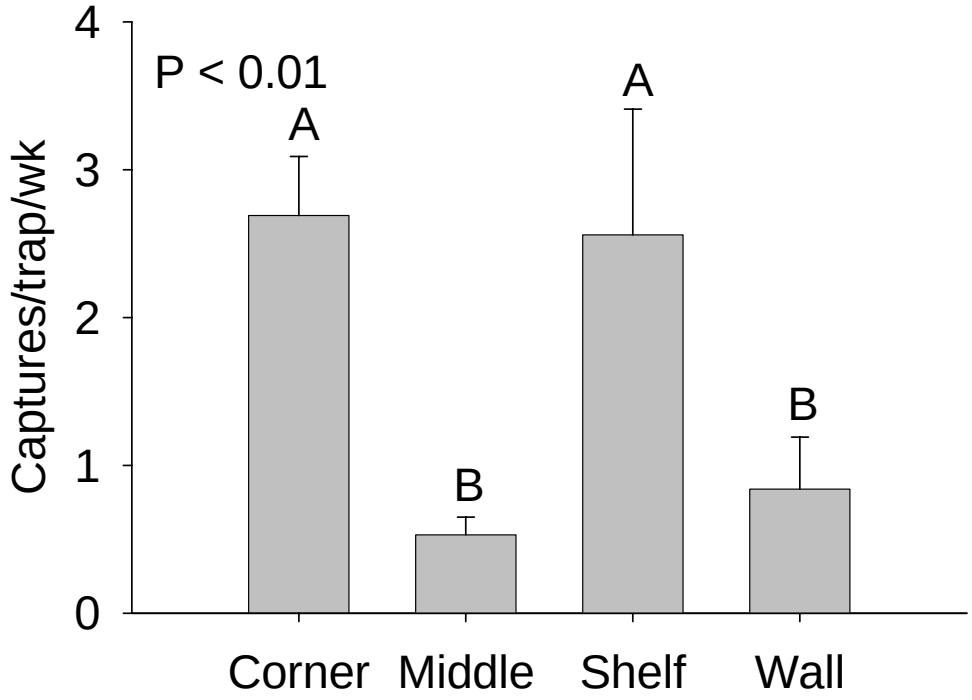
How does sanitation affect insect captures?



- Replicated warehouses were provisioned with 50 RFB adults
- Trt: trap position
- Trt: food patches under shelves vs. no food
- Response variables: number and location of RFB captures in traps

Results





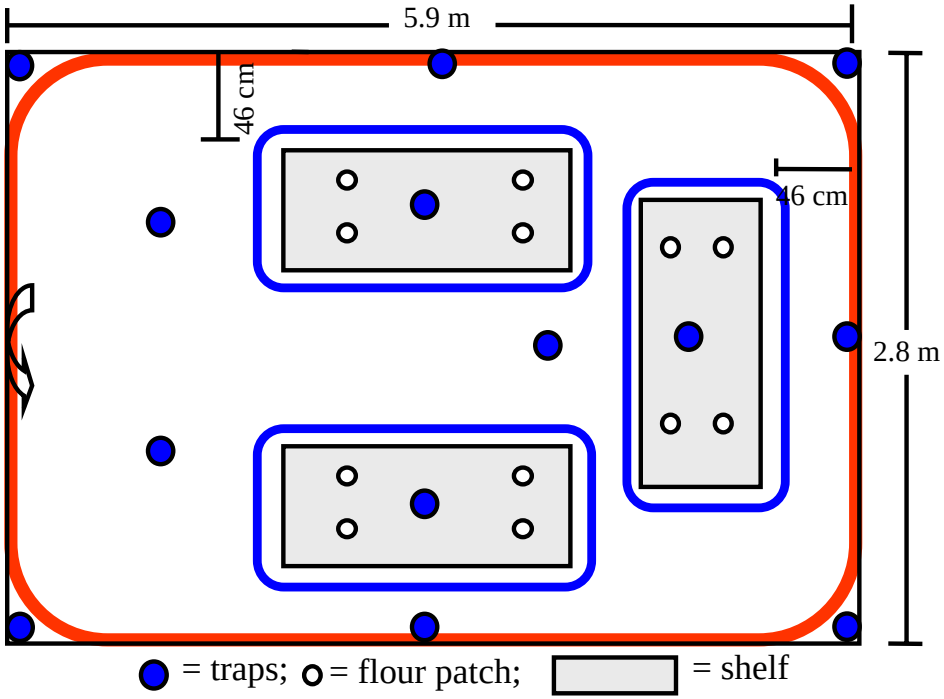
Pearson correlation coefficients

No food: r = 0.96; P < 0.01

Food: r = 0.50; P = 0.31

Toews et al. 2005a

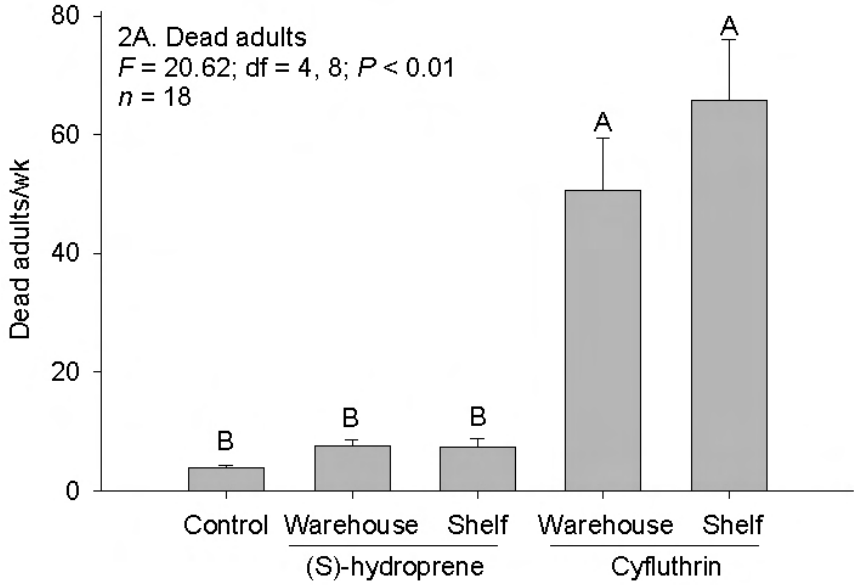
Do insecticide applications affect monitoring ability?

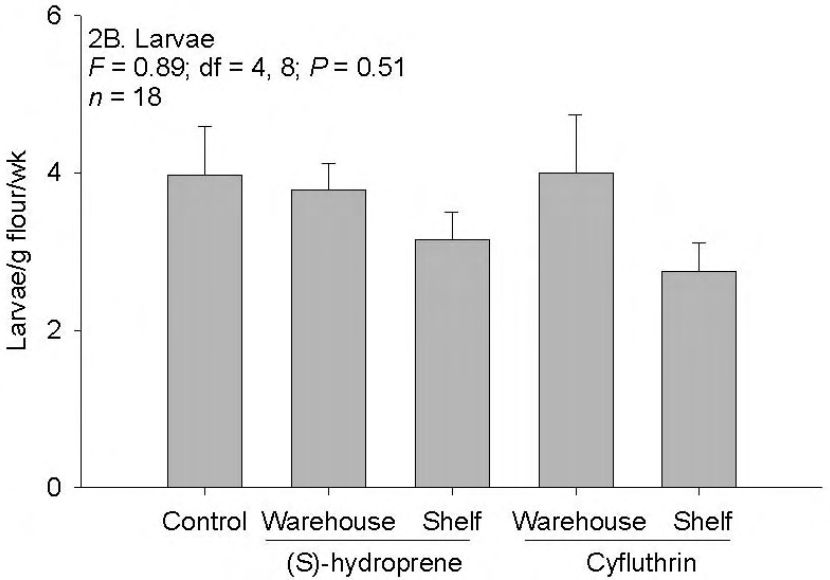


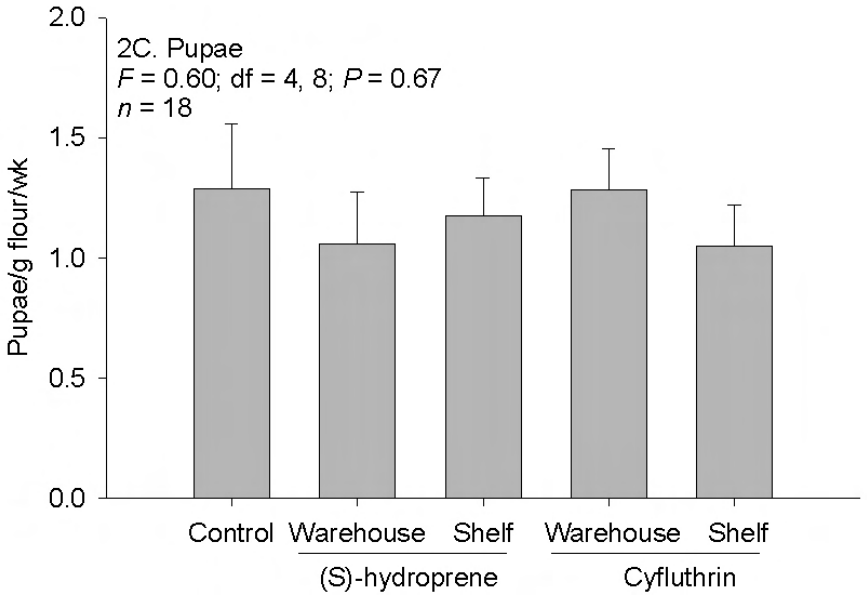
- Replicated warehouses with food patches and 200 RFB adults, pupae, larvae, and eggs
- Trt: cyfluthrin, (S)-hydroprene, or water
- Response variables: dead adults, captures in traps, live insects in food patches

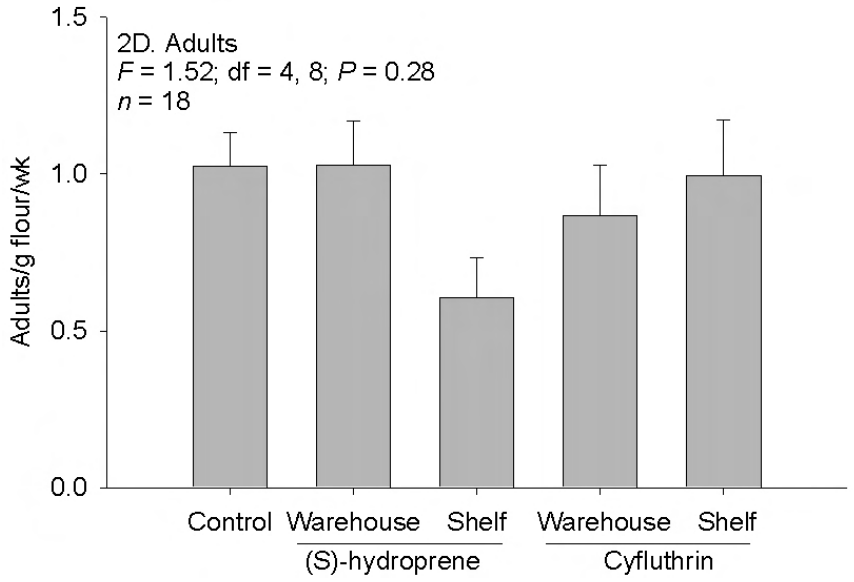
Independent trials

Direct samples

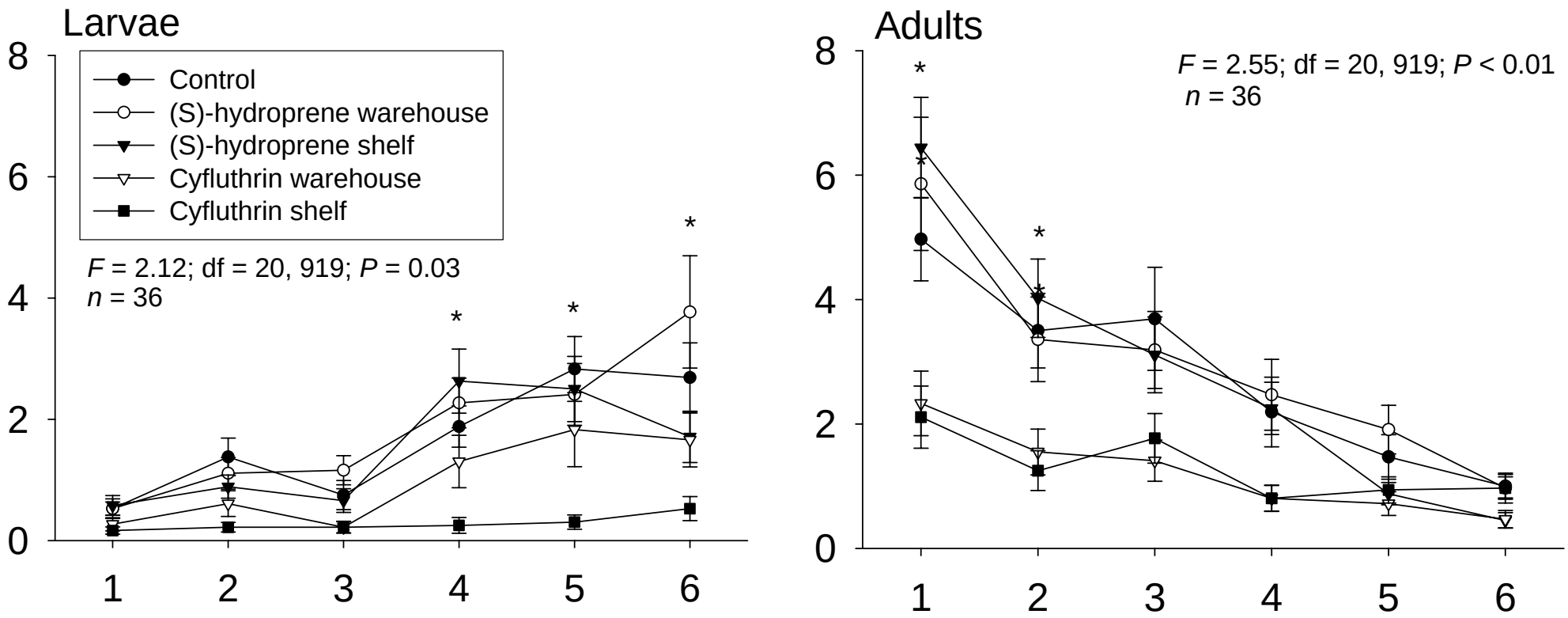






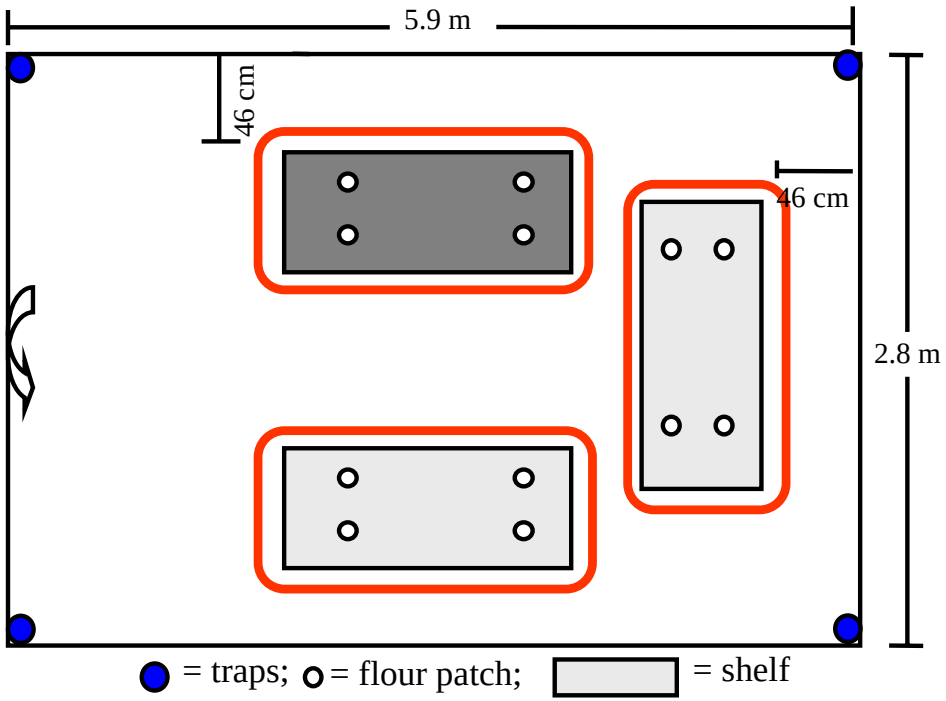


Captures in traps



Toews et al. 2005b

Do captures in traps indicate the same trends as direct product samples?



- Replicated warehouses were provisioned with 200 RFB adults, pupae, larvae, and eggs under north shelf only
- Trt: cyfluthrin or water around all shelves
- Response variables: dead adults, captures in traps, live insects in food patches

Conclusions

- Data suggest that better sanitation will improve trapping efficiency
- Insecticide usage may decrease the number of insect captures in traps
- Pheromone-baited traps are useful tools for monitoring, but adult captures do not always correlate with the true population
- Presence of dead adults does not necessarily indicate that the population is declining

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