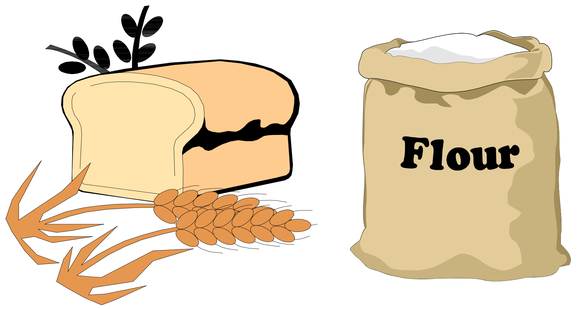

Insecticides to Control Stored-Product Insects in Mills, Processing Plants, Food Warehouses, and Urban Storages

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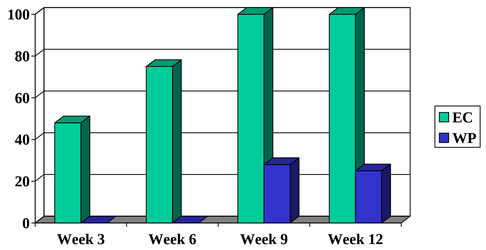
Red Flour Beetle (RFB) and **Confused Flour Beetle (CFB)** are major pests of stored food. Newer insecticides used to control these pests have reduced mammalian toxicity. Physical and biological factors can affect insecticidal efficacy. These factors include insecticide formulation, temperature, relative humidity (RH), the presence of food materials, and insect species.


RFB


CFB

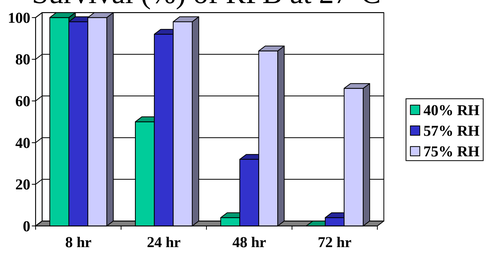
Example: Formulation Effects
The emulsifiable concentrate (EC) of the pyrethroid Cyfluthrin is less effective than wettable powder (WP) on concrete (both 40.0 mg [AI]/m^2).

Survival (%) of RFB EC vs WP

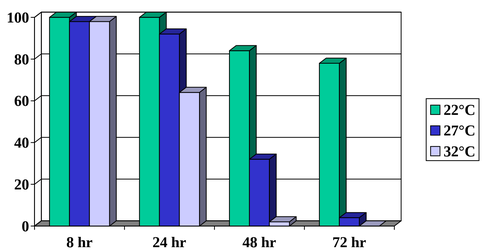


Example: Environmental Effects—With 5.0 g/m^2 diatomaceous earth (DE), survival increases with RH and exposure interval, decreases with temperature.

Survival (%) of RFB at 27°C

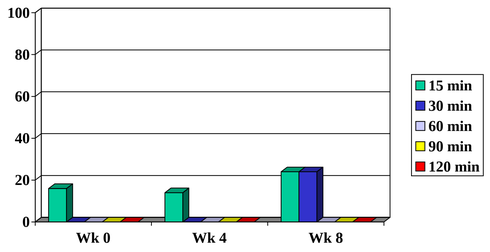


Survival (%) of RFB at 57% RH

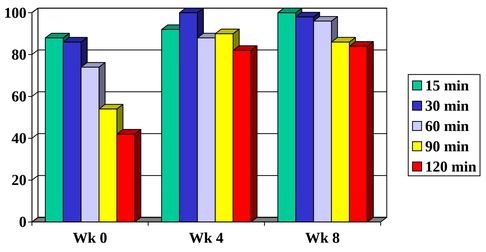


Example: Physical Effects—Presence of food material can lead to increased survival after exposure to insecticides. Survival of RFB exposed on concrete treated with 20.0 mg [AI]/m^2 cyfluthrin WP, then starved or given food.

Survival (%) of RFB **Without** Food

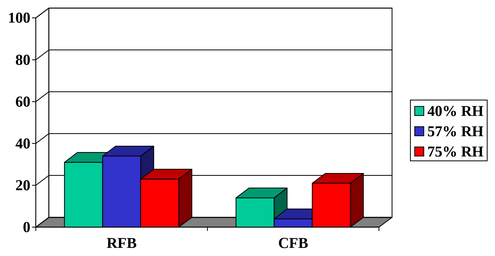


Survival (%) of RFB **With** Food

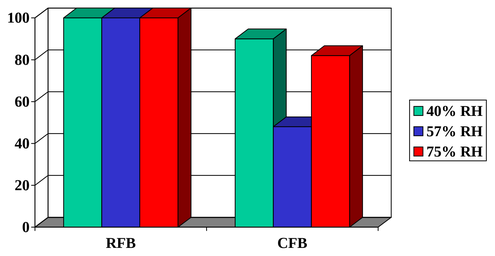


New Research with Insect Growth Regulators (IGRs) which affect insect molting hormones and prevent or inhibit adult emergence.
Studies with hydroprene (Gentrol , 19.0 mg [AI]/m^2) as a surface treatment. Four week old RFB and CFB larvae exposed to this label rate at 27°C, 40, 57, and 75% RH. RFB is slightly more susceptible than CFB to Gentrol.

% of Arrested Larvae

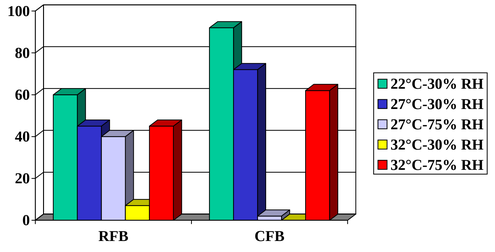


% of Dead Adults out of Total Emergence

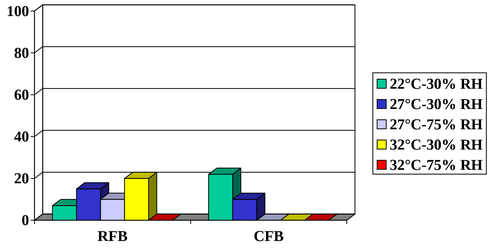


Studies with Pointsource, a volatile source of hydroprene that controls insects in confined spaces. Three and four week old RFB and CFB larvae exposed to Pointsource at different RH and temperatures. Younger larvae were more susceptible and RFB was more susceptible than CFB.

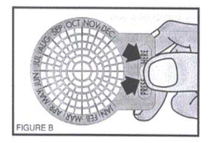
% of Arrested 3-week Old Larvae



% of Arrested 4-week Old Larvae



Picture of Pointsource wick. By pressing the tab, the volatile hydroprene is activated.



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Insect photos courtesy of the USDA-ARS-GMPRC website.