

# Uses of pheromones for insect control in Colorado

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## Quick Facts

Pheromones are chemicals produced by insects that regulate many types of behavior.

Pheromones, particularly sex pheromones, have been exploited for use in pest management in Colorado.

The primary uses of pheromones are for pest detection. Other applications such as mass trapping and mating disruption are planned for future use.

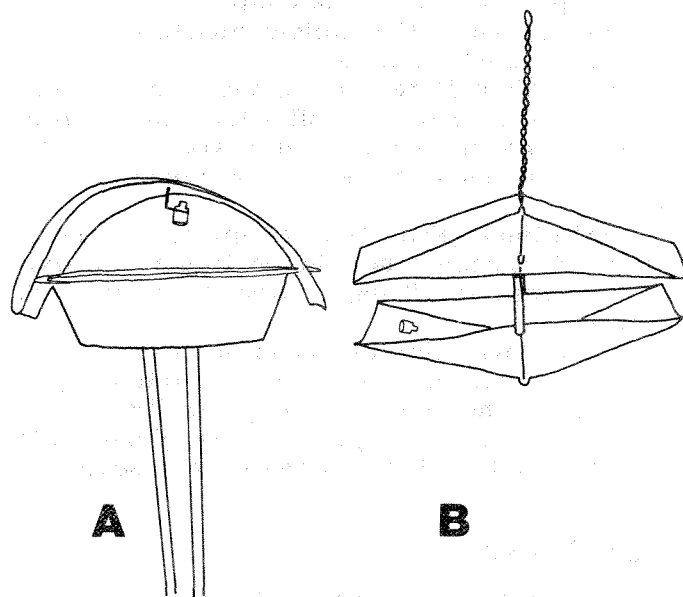


Figure 1: Two types of pheromone traps. A. water-pan trap. B. wing trap.

Many insects communicate by the use of chemicals called pheromones. Pheromones regulate many types of insect behavior. Sex pheromones are produced by one sex (usually the female) to attract the other sex for mating. Mass attacks by certain bark beetles are coordinated by aggregation pheromones that attract other beetles to the same tree. Alarm pheromones are produced by honeybees to help in hive defense.

Insect pheromones, particularly the sex pheromones of moths, are among the most biologically active compounds known. A single molecule of pheromone can be detected by some species. Because of this sensitivity, insect pheromones have been exploited for use in insect management.

For many pest insects synthetic sources of pheromones are available and are used for pest detection in Colorado. A lure containing the synthetic pheromone most commonly is placed in the bottom of a trap coated with a sticky material (Fig. 1). Insects attracted to the trap are entangled in the sticky bottom. For most species the lure is attractive for one to three months.

Other trap designs exist (sticky cards, water pan traps, cone traps) and may give improved trap catch for some species. Pheromone traps are more convenient to use than other kinds of traps, such as blacklights, which are non-specific, cum-

bersome and require batteries or access to an electrical source. Pheromone traps allow the grower or homeowner to make a better decision about when to apply control measures. Also, pheromones have been used to detect the presence of "exotic" pests such as the gypsy moth, which only have been recently detected in Colorado.

Pheromone uses recommended in Colorado involve sex pheromones produced by female moths. These traps only attract males of the same species and **do not** increase the level of pest infestation around a trap site. More general attractants such as food lures or aggregation pheromones can increase insect activity in the vicinity of a trap. The primary uses of pheromones in Colorado are summarized below.

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## Fruit

**Codling moth**—Captures of the first male moth can be used to estimate closely the occurrence of egg laying when "degree day" models are used. For example, in the West Slope fruit-growing areas first insecticide applications are recommended 270-420 degree days (base temperature of 50° F) after the first male is caught in the pheromone trap. As a general rule, control measures for codling moth should be implemented three to four weeks after the first male is caught.

**Peach Tree Borer**—Treatments are recommended seven to 10 days after the first moth is captured and at monthly intervals as long as traps continue to capture at least five moths per week.

**Leafrollers** (Fruit-tree, Omnivorous, Tree-lined)—Treatments should be timed approximately seven to 10 days after the first moth captures.

**Peach Twig Borer**—Detection of the first-generation flight indicates the time to treat apricots. The second-generation flight indicates timing for protection of peach trees. Treatments should be made eight to 10 days after these flights begin.

## Shade Trees

**Lilac/Ash Borers and carpenterworms**—Treatments should be applied seven to 10 days after the first moth is captured. If strong flights continue (5 or more/week), reapplications are suggested at monthly intervals.

**Southwestern Pine Tip moth**—Detection of male moths in traps indicates the need for control measures to be applied to the pine terminals within one to two weeks.

**Bark beetles**—Experimental applications of bark beetle aggregation pheromones for control are in progress. Most trials involve attracting beetles to trap trees that will be treated with insecticide or logged. Bark beetle pheromones are not recommended for homeowner pest control.

## Vegetables

**Corn Ear Worm**—Detection of moths indicate the time to spray sweet corn. If moths continue to be trapped treatments should continue.

## Stored Products

**Indian Meal Moth, Lesser Grain Borer, Red and Confused Flour Beetles, Sawtooth and Merchant Grain Beetles**—Pheromones are used for these species to detect an infestation and when insecticide treatment is needed.

## Future Uses

Research on the identification and uses of insect pheromones is an active area and new developments continue to be made. Potentially, pheromones may be used to "trap out" certain Colorado pests or to attract insects to insecticide baits, reduce the number of insecticide applications or to confuse insects and thereby disrupt mating. This Service in Action sheet only is written to summarize the progress made through 1985; updates will be made as significant developments occur. A listing of commercial sources of pheromones and pheromone traps can be obtained by writing the Extension Entomologist, Department of Entomology, Colorado State University, Fort Collins, CO 80523.