# Using Pheromones for Insect Management in New Mexico

**Cooperative Extension Service**
**College of Agriculture and Home Economics**

## Guide H-152

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The insect's world is filled with many odors. Insects use these odors to cue them in a variety of complex social behaviors, including courtship, mating, and egg laying. Scientists and pest control specialists have known about these complex communication systems for decades. Recently, this high technology has been made available for use by the average person because these chemicals, called pheromones (pronounced fer-a-mons), can be produced synthetically.

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 honey bees and aphids to help in colony defense. Trail pheromones are produced by ants to help other worker ants find food sources.

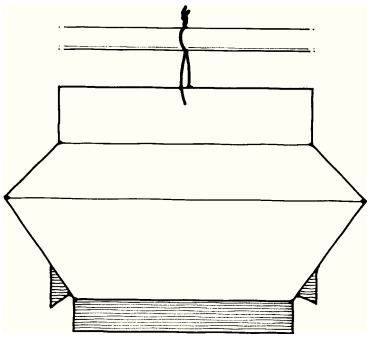
Insect pheromones, particularly the sex pheromones of moths, are among the most biologically active compounds known. A single molecule of pheromone can be detected by some species. Because of this sensitivity, insect sex pheromones are now used in insect management.

Synthetic sex pheromones are available for many pest insects, and are used for pest detection. More than 60 types of pheromone or other trap types are available from commercial sources listed at the end of this publication. Two commonly used trap types are the delta and wing traps (fig. 1).

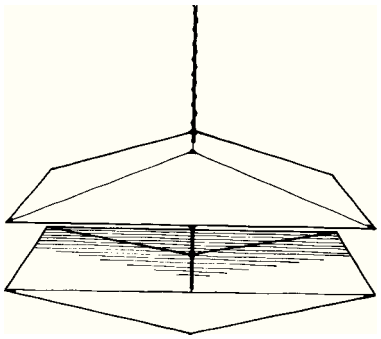
Other trap designs (fig. 2) exist (funnel traps, sticky cards, water pan traps, cone traps) and may improve the catch for some species. Pheromone traps are more convenient to use than other kinds of traps, such as blacklights, which are non-specific, cumbersome, and require batteries or access to electricity.

Pheromone traps allow the grower or homeowner to make a better decision about when to apply control measures. Because of this, they can form an integral part of an IPM (integrated pest management) program. Also, pheromones have been used to detect the presence of exotic pests such as the gypsy moth, which has been detected in neighboring states.

Pheromone uses recommended in New Mexico primarily involve sex pheromones produced by female moths. These traps only attract males of the same or closely related 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 New Mexico are to help determine:

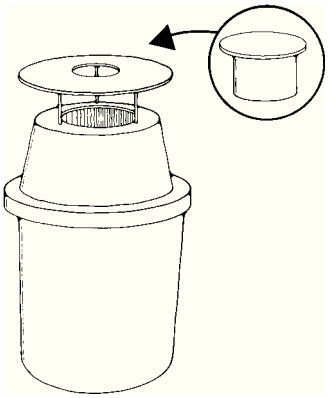


Delta trap

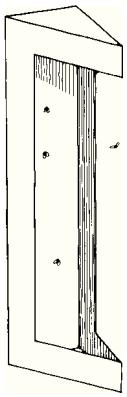


**Wing trap**

**Fig 1. Two types of pheromone traps.**



**Funnel trap**



**Sticky cards**

**Fig. 2. Other types of traps.**

- emergence of the first insects of the season
- effectiveness of a dormant spray
- iming of spring and summer sprays
- where the moths are coming from
- moth density
- population trends from year to year

**FRUIT**

General recommendations for pheromone trap use in fruit orchards are as follows:

1) Timing for initial placement— Place traps in the orchard in spring, early enough to capture the first male insects. More specific timing depends on the specific population patterns of each insect.

2) Placement of traps—Hang traps 4–8 feet high and try to keep traps in the same quadrant in each tree (i.e., the northeast corner). Place traps 1–2 feet inside the tree canopy.

3) Density—Use at least three traps per orchard. Recommended density:

1 trap / 5 acres—up to 20 acres
1 trap / 10 acres—20 to 80 acres
1 trap / 20 acres—greater than 80 acres

4) Checking and servicing traps—count and remove the insects at least once a week, preferably 3 to 7 times a week during periods when the pests are most likely to be flying in the greatest numbers. Record the number of pests caught and the date the trap was checked in order to find out how many pests were present per day. Replace pheromone dispensers (synthetic pheromone source) every 2–4 weeks to make sure a constant level of pheromone is being released. Replace sticky cardboard bottoms of traps every 200–300 pests collected, or as the sticky surface becomes dirty. Keep a record of dates and types of trap service to assure proper trap function. The objective is to keep about the same degree of stickiness in the trap throughout the trapping season, and to keep track of expenses.

5) Dispenser storage and removal—Keep dispensers in the freezer until needed for use. Do not leave used septa or dispenser containers (wrappers) in the orchard or garden.

6) Trapping multiple pests—Place each trap type in a separate tree.For example, don't put peach tree borer and oriental fruit moth pheromone traps in the same tree. Best if the trees are at least 30 feet apart.

Recommendations for specific fruit insect pests are as follows:

*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 north central fruit-growing areas, first insecticide applications are tentatively recommended 270–420 degree days (base temperature of 50° F) after the first male is caught in the pheromone trap. The degree day concept is still being studied; therefore, as a general rule, control measures for codling moth should be implemented 3 to 4 weeks after the first male is caught, if populations exceed two moths per trap per week for 2 consecutive weeks.

Specific recommendations for pheromone trap use in monitoring codling moth populations are given in table 1.

*Peach Tree Borer* —Treatments are recommended 7 to 10 days after the first moth is captured, and at

monthly intervals as long as traps continue to capture at least 5 moths per week. An alternative fall application may also be used. Contact your county extension agent for details.

*Leafrollers* (fruit tree, omnivorous, three lined)— Treatments should be timed approximately 7 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 to protect peach trees. Treatments should be made 8 to 10 days after these flights begin.

*Western Cherry Fruit Fly*—Treatments are recommended 7 to 10 days after the first flies are captured in the spring, usually several weeks after petal fall.

## SHADE TREES

*Lilac/Ash Borers and Carpenterworms*— Treatments should be applied 7 to 10 days after the first moth is captured. If strong flights continue (5 or more/week), reapplications are suggested at monthly intervals.

*Nantucket Pine Tip Moth*—Begin monitoring at least by mid-April to determine when peak moth flights occur. Control measures should be applied 5 to 10 days after each peak flight. Up to 5 flights can occur each year, depending upon location in the state. Only 2 flights occurred in the Albuquerque area in 1988, with sprays being recommended on May 5–15 and July 7–17. These dates must be determined each year for maximum effectiveness of the treatments.

*Bark Beetle*— 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 Earworm*— 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.

## NUISANCE PESTS

*Wasps, Yellow Jackets, Bees and House Flies* — Traps will help reduce population levels around houses and parks.

## GREENHOUSES

*Whiteflies and Aphids*— Yellow sticky traps are used to help reduce populations and monitor population levels for timing chemical controls.

**Table 1. Recommendations for Pheromone Trap use for Codling Moth in Monitoring and Control Applications.[a]**

| Trap unit and operation | Timing of control measures | Determination of population levels | Evaluation of mating disruption | Mass trapping |
|---|---|---|---|---|
| Trap design | Pherocon 1 CP [c] | Same | Same | Same |
| Pheromone dispenser | Pherocon rubber stopper [c] | Same | Same | Same |
| Maintenance schedule [b] | | | | |
| Trap renewal | Every 4 wks or after cum. catch of 70 moths | Same | Same | Same |
| Pheromone dispenser renewal | Every 6 wks | Same | Same | |
| Removal of catch | 2 times/wk | Once/wk | 2 times/wk | Once/wk |
| Trap placement (temporal) | Before spring emergence until end of flight | Same | Same | Same |
| Trap placement (within tree): | | | | |
| Elevation | 1/3 up of vertical canopy dimension | Same | in upper 1/3 of canopy | in upper 1/3 of canopy |
| Quadrant | Southeast at periphery of canopy | Same | Same | Same |
| Trap placement (within orchard): | | | | |
| Center traps | Evenly spaced throughout orchard | Uniform grid pattern | Same | Same |
| Border traps | | If influx suspected | Same | Same |
| Trap density | Minimum of 3 | At least 1/ha in small; 1/5 ha in large orchards | At least 1/ha | Optimal trap density not known |

[a] From Western Regional Research Group. 1986. WRRPO12 (University of California Bulletin 1918): p. 17.

[b] Or Pherocon 1 CP trap and Pherocon rubber septum: will vary with other trap units.

[c] Or other trap unit if comparative data available; Pherocon is a registered trademark..

## FUTURE USES

The identification and uses of insect pheromones is an active area of research, and new developments continue to be made. Potentially, pheromones may be used to trap out certain New Mexico pests and to attract insects to insecticide or chemosterilant baits, reduce the number of insecticide applications, or to confuse insects and disrupt mating. Use of traps as a sampling tool to determine need for and timing of control measures can provide the basis of an Integrated Pest Management (IPM) strategy for these pests. Studies are continuing to help refine these techniques. This guide is written only to summarize the progress made through 1988; updates will be made as significant developments occur. A listing of local and commercial sources of pheromones and pheromone and other types of traps is below. Some nurseries and agricultural and lawn care products distributors may also be able to special order these supplies. Those listed have at least some of them in stock.

## SOURCES


Cranshaw, W. S., and W. L. Meyer. 1986. *Uses of pheromones for insect control in Colorado.* Colorado State Univ., Coop. Extension Serv., Service in Action Publication No. 5.562, 2 pp.

Mueller, D.1985. *Pheromone.* Pest Control Technology, April,1985: 62-65

Sholberg, P. L., F. G. Zalkin, and R. F. Hobza. 1985. *Stone fruit orchard pests: Identification, Biology, and Control.* Calif. Dept. of Food and Agric., Div. of Pest Mgt. Sale Pub. No. 518, 418 pp.

Western Regional Research Group. 1986. *Codling moth management—Use and standardization of pheromone trapping systems.* Univ. of Calif., Division of Agri. and Natural Resources, Western Regional Research Publication WRRP012 (Univ. Calif. Bull. 1918), 23 pp.




NOTE: Further information concerning use of pheromones for crops may be obtained by writing to the commercial sources listed above for these products.

**Local Distributors:**

Helena Chemical Company
Box 629
Mesquite, NM 88048
(505) 233-3171
or 1-800-432-7581

Van Water & Rogers, Inc.
PO Box 25187
3301 Edmonds Ave., SE
Albuquerque, NM 87125
(505) 842-6303 or
1-800-432-6614

**National Distributors (All Brands):**

Great Lakes IPM
10220 Church Road, NE
Vestaburg, Michigan 48891
(517) 268-5693

Insects Limited, Inc.
10540 Jessup Blvd.
Indianapolis, IN 46280-1451
1-800-992-1991

Pest Management Supply Co.,
P.O. Box 1192
Brownfield, TX 79316-1192
(806) 637-3538

**National and International Distributors /Manufacturers:**

Biological Control Systems Ltd.
Treforest Industrial Estate
Treforest, Pontypridd
Mid Glamorgan CF375SU,UK

Consep Membranes, Inc.
P.O. Box 6059
Bend, OR 97708
(503) 388-3681

Gardens Alive
Natural Gardening Research Center
P.O. Box 149
Sunman, IN 47041
(812) 623-3800

Necessary Trading Co.
P.O. Box 305
New Castle, VA 24127
(703) 864-5103 or
1-800-447-5354

Pacific Biocontrol
719 Second St., #12
Davis, CA 95616
(916) 757-2307

Phero Tech Inc.
7572 Progress Way
Delta, B.C.
Canada V4G 1E9
Tel: (604) 940-9944
Toll Free: 1-800-665-0076
Fax: (604) 940-9433
E-mail: sales@pherotech.com
WWW: www.pherotech.com

Research Institute for Plant Protection
P.O. Box 9060
6700 GW Wageningen
The Netherlands
Attn.: Dr. Simon Voerman

Scentry, Inc.
A United Agri. Products Co.
P.O. Box 426
Buckeye, AZ 85326-0090
(602) 233-1772 or
(602) 386-6737

Shi-Etsu Chemical Co.
6-1, Ohtemachi 2-Chome
Chiyoda-Ku
Toyko 100, Japan

Sigma Chemical Co.
P.O. Box 14508
St. Louis, Missouri 63178

Trece, Inc.
P.O. Box 5267
Salinas, CA 93915
(408) 758-0205

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