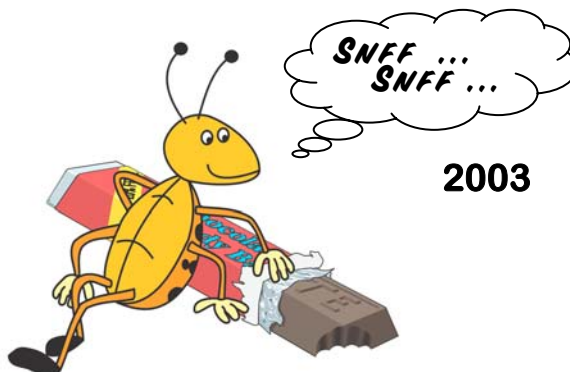


Product Guide

Pheromone Traps & Lures

**Integrated Pest Management Resources For Food
Processors and Warehousemen**



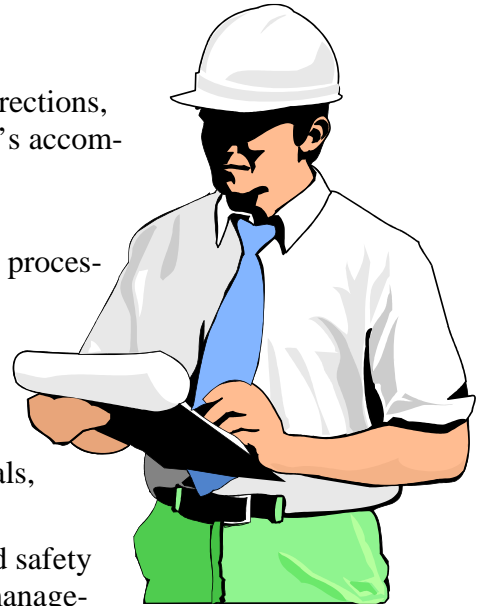
What's Inside

- *Who We Are* Page 2.
- *What Are Pheromones?* Page 3
- *Pheromones and IPM*Pages 3-4
- *X-Lure R.T.U.* Page 5
- *SafeStore Pheromone Lures & Traps*Pages 6-9
- *Pheromone Uses: Tips, Tricks, & Tactics* . . . Pages 10-11

Who We Are

Mike Holcomb is Founder and President of Technical Directions, Inc., A Decatur, AL based consulting firm. A sampling of Mike's accomplishments and involvements include:

- ◆ Mike is a graduate entomologist who has been advising food processors and warehousemen for nearly 25 years.
- ◆ A gifted teacher, Mike has worked all over North America, Mexico, and Canada, and has even traveled as far away as South Korea and Denmark when needed.
- ◆ Mike publishes numerous articles in pest control trade journals, and is the founder of *The Sanitarian* newsletter.
- ◆ A frequent speaker at state and national pest control and food safety conferences, Mike is on the cutting edge of integrated pest management, sanitation, and food safety.



The firm's expertise is in entomology, integrated pest management, pesticide safety, sanitation, food GMPs, HACCP, and regulations impacting these areas. Our services are provided through classroom and hands-on training, on-site audits, and confidential consultations.

With the publication of this Product Guide, Technical Directions can now make safe and effective pest management tools readily available to the food industry.

Pheromone Traps and Lures

What Are Pheromones?

Pheromones (derived from 2 Greek words meaning “to carry” and “to excite”) are a special class of non-toxic chemicals. These man-made compounds mimic hormones produced in minute quantities by insects. Insect pheromones attract other insects of the same species (or sometimes a closely related species), but have no effect on non target organisms including humans. These compounds are extensively used in agriculture and forestry to detect the presence of insect pests, and to monitor population increase or decrease over time. Pheromone lures used for stored product insects fall into two categories:

1. ***Sex Pheromones*** are produced by female insects to attract males for mating.
2. ***Aggregation Pheromones*** are produced by either or both sexes to attract males *and* females to food and harborage.

Interestingly, long-lived insects (such as flour beetles which can live for a year after becoming adults) produce aggregation pheromones, while pests with short-lived adults such as the Indian meal moth and the cigarette beetle use sex pheromones. Since no drive in nature is stronger than the need to procreate, sex pheromones are much more effective than are aggregation pheromones. In an attempt to increase the effectiveness of aggregation pheromones, food attractants are usually added to the lure. We find these food attractant plus pheromone lures to be more effective than aggregation lures alone.

Since pheromones are quite species specific and do not counteract one another, we highly recommend placing several different lures in each pheromone trap. Multi lure traps are much more economical and time saving than are single species traps.

Pheromones and IPM

The first step in any integrated pest management program is to correctly identify the pest *and* to determine the size/location of the infestation. Pheromone lures provide early warning detection of potentially damaging stored product insects such as the cigarette beetle and the Indian meal moth. Traps must be inspected weekly and counts must be recorded for follow-up. If no insects are captured in the pheromone lures, these traps provide verification that no stored product insects are nearby to pose a risk to the products under your care.

Pheromone Traps and Lures cont.

Technical Directions: *Our Pheromone Philosophy*

At TDI, we are firm believers in the “early warning detection” feature provided by pheromones. We are particularly impressed with the effectiveness of the sex pheromones used for the Indian meal moth, the cigarette beetle, and the *Trogoderma* beetles (warehouse and Khapra).

We are brokers for the lures produced by Russell Products, the most effective of which are listed on the following pages, and we have lures and traps for both flying and crawling stored product insects. As integrated pest management consultants we can provide guidance on lure selection, layout, and monitoring programs. If you simply need lures and traps, call or e-mail our office for current pricing. If, on the other hand, you need technical guidance in establishing or maintaining a pheromone monitoring program, we can tailor a consulting package for your specific plant.



Pheromone trap (X-Lure R.T.U.) attached to the end of a storage rack in a food warehouse.

XLure R.T.U.

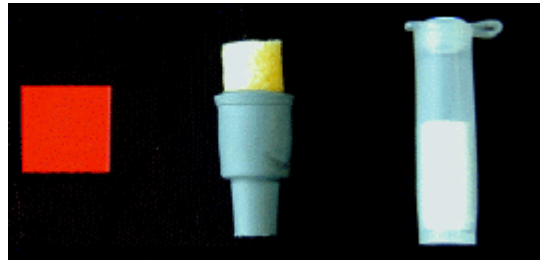
This ready-to-use trap is both an economical and user friendly pheromone monitoring system for flying insects. Features include

- Pheromones are organic compounds that are very heat and light sensitive. Normal lures begin to degrade in storage and breakdown rapidly after opening. Pheromones in the X-Lure R.T.U are embedded in a heat- and light-protected medium known as Pherogel, and can be stored at ambient room temperatures in a food plant or warehouse for up to 2 years -- no cold storage is required! Once opened and exposed to environmental conditions, the X-Lure can last for up to 8 weeks.
- The Pherogel + pheromone matrix is injected directly into the trap's glue. Direct contact with the actual pheromone lure is essentially eliminated. Simply open the cardboard trap and hang it up.
- Traps can be purchased for stored product insects the warehouse beetle, the Indian meal moth and its relatives, or the cigarette beetle. A combination trap is available that contains lures for all of these important pests.





Available Lures





In flour mills, bird seed packaging plants, pet food plants, feed mills, etc. pheromone traps can become dusty in a very short time. *Dust covered glue traps will not capture insects.* SafeStore Traps are designed for use in dusty environments where the 8-week pheromone lure can easily outlive the glue board trapping device. Simply remove the lure(s) from the soiled trap, discard the soiled trap, and re-insert the same pheromone lure into the new trap. Lures and traps are available in a variety of formats:

Available Traps

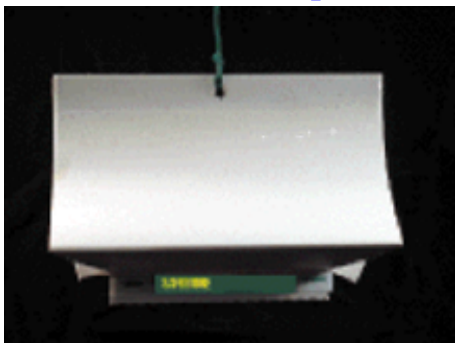
Trapping devices for the SafeStore system come in the two styles shown below. One style is the aerial (hanging) cardboard trap known as the **Diamond Trap**. Diamond Traps are designed to be hung from a shelving unit or storage rack, or even a ceiling or steel column. The **Easy Read Trap** is a clear-view, clam shell plastic trap designed to be placed on the floor, on a horizontal ledge such as a beam, or any flat surface. It is particularly useful in dusty environments! The Easy Read Trap will capture flying insects such as the Indian meal moth, cigarette beetle, and warehouse beetle, but it is most effective against crawling insects such as the flour, saw-toothed, and merchant grain beetles. SafeStore traps and lures are available in a variety of combinations, all of which are outlined in the table on page #8 in this product guide.

Replacement lures for the SafeStore system are packaged in 3 different formats:

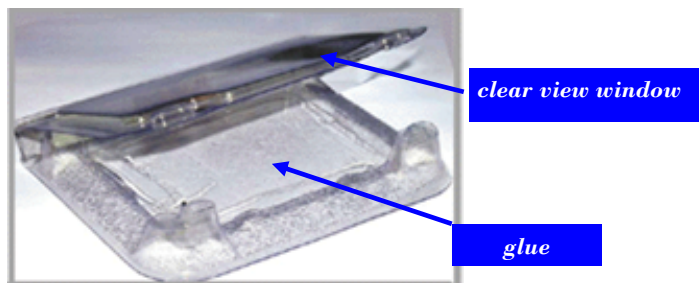
- A red rubber square known as a membrane lure,
- A eraser-like rubber device known as a septum, and
- A small plastic vial that we call a 10ml tube lure.

Since there is virtually no repelling effect between the various (sex) pheromones, traps can be armed with one lure, or several. SafeStore traps and lures can be ordered separately (providing you the flexibility to customize traps to suit your individual needs) or in Kits as outlined in the Table on pages 8 & 9 of this Product Guide.

Diamond Trap

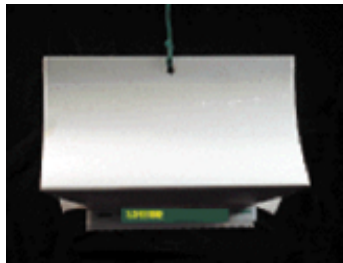


Easy Read Trap (opened)



Diamond Traps & Lures

Diamond Traps & Lures



The following Diamond Traps are available. Each Kit consists of 10 traps and 10 individual lures. Lure style is listed in parenthesis following the name of the target pest. Also, there are 10 Kits (100 lures and traps) in a case. Individual Kits (10 traps + 10 lures) can be purchased, or in Case form (100 traps + 100 lures).

Angoumois Grain Moth (membrane lure)



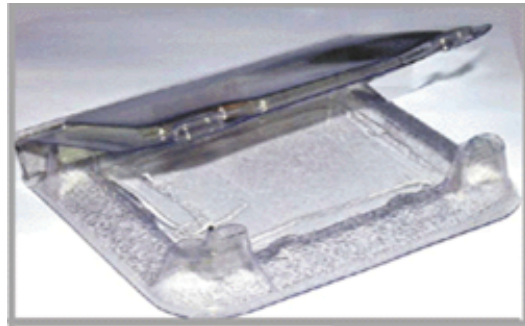
Red and Confused Flour Beetles (rubber septum)
Indian Meal and other stored product moths (rubber septum)
Cigarette Beetle (rubber septum)
Drug Store Beetle (rubber septum)



Warehouse Beetle (rubber septum or 10ml tube)



Easy Read Traps & Lures



The following Diamond Traps are available. Each Kit consists of 10 traps and 10 individual lures. Lure style is listed in parenthesis following the name of the target pest. Also, there are 10 Kits (100 lures and traps) in a case. Kits are sold individually or in Case form.

Red and Confused Flour Beetles (rubber septum)

Indian Meal and other stored product moths
(rubber septum)

Cigarette Beetle (rubber septum)

Drug Store Beetle (rubber septum)

Saw-Toothed & Merchant Grain Beetles (rubber septum)



Warehouse and Khapra Beetle (rubber septa or
10ml tube)



Tips, Tricks, & Tactics For Pheromone Traps

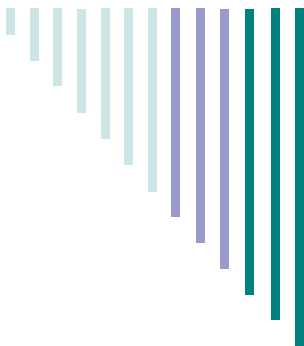
1. When traps are installed, mark them with the installation date to ensure proper rotation of the lure. This is easy to do on the cardboard diamond-style traps, but on the plastic Easy Read traps a sticker must be attached on the bottom or in such a way as to not obstruct your vision (inspection) through the clear window on top of the trap.
2. Traps should be numbered in sequence; identify placements on a plant schematic so that corrective follow up can be undertaken.
3. Count insects in the trap and record the numbers weekly. Transpose these data onto a line graph (this is easy with a software spreadsheet program like Excel) and watch for population increase over time. When abnormal beetle or moth activity is observed, respond immediately: traps are monitoring tools, they are not controls tools.
4. As a rule of thumb, traps have an effective range of about 30-feet. Do not place traps within 30 feet of one another, nor within 30 feet of a door or other opening.
5. Outdoor traps can be used to monitor stored product insect activity on the outside grounds. Correlated with indoor trap data, outdoor trap activity can give you a hint as to whether you are dealing with a plant infestation or with insects that are invading the plant. Outdoor traps will become quickly overwhelmed and must be monitored frequently. We recommend using special, high-volume traps with UV-protected lures for this (call our office for details). Also, traps should be located on the fenceline or as far away from the building as possible so as not to attract pests to sensitive areas.
6. Place traps where they can be protected from fork lift and other damage, and where they can be inspected and serviced without the need of a ladder or safety cage — eye level is best. Traps should be located near safety posts and columns, end of storage racks, etc.

7. Pheromone lures need gentle air movement to carry the scent from the trap to the target insect. Do not locate traps in dead airspaces such as inside a steel column.
 8. Do not expect to capture flour beetles, saw-toothed grain beetles, Khapra beetles and other flightless insects in Diamond Traps which are suspended on a tether. Such traps are designed for flying insects! Traps must be placed on a ledge, floor, or other flat surface to capture crawling (flightless) insects such as the Khapra and confused flour beetle.
 9. Only adult insects are attracted to pheromones. Larvae (the feeding and growth stage of the life cycle), are not looking for sexual partners eventhough you may find them in the trap. Since larvae do not venture far from their food source, their capture in a trap shows that the trap is positioned very close to the point of infestation!
 10. To better pinpoint the source and narrow down your search, place temporary traps between stations that show high counts. After the source has been located, remove the temporary trap(s).
 11. Pheromone lures are harmless to humans and can be handled with bare hands. However, tweezers or latex gloves will keep glue off your fingers. Also, handling bare lures will leave tell-tale residues on your fingers; when you go outside or visit your neighborhood mass marketing store you will be swarmed by flying insects! Personally, I have no problem with this, but it could be embarrassing in church or a restaurant!
 12. Pheromone traps will capture non target insects like fungus gnats and houseflies. These insects are not attracted to the lure, but glue is non discriminatory. As such, pheromone traps can help you monitor for all kinds of insects, not just stored product pests.
 13. When traps become dusty and loose their tackiness, they must be replaced. In dusty environments utilize cheap traps with removable lures, or traps such as the Easy View that is more dust proof.
 14. Even if you do not catch any insects in a pheromone trap, traps are still valuable because they verify that no insects are present. This can prove to regulatory or customer inspectors that you have no insect issues. Also, this could be valuable information during customer complaints.
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TDI has many other Product Guides in development, most of which will be available in print form, or on CDs for viewing with a computer. We are currently developing Guides for

- ◆ **Insect Light Traps**
- ◆ **Rodent Control Devices**
- ◆ **Insecticides and Application Equipment**

In the meantime, if you need any integrated



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