75¢

Selecting and Monitoring

Pheromone Traps

in Insect Pest Management

Figure 1.—This Scentry wing trap, hung 3 feet from the ground near the trunk of this peach tree, is monitoring flights of the peach tree borer.

Pheromones are chemical messages produced and released by one individual to influence the behavior of another individual. Insects use pheromones to attract mates, mark trails, communicate alarm or danger, and regulate other important behaviors.

The word *pheromone* also pertains to the chemicals themselves that make this communication within a species possible. Plant or food odors that we sometimes use to attract specific insects are not actually pheromones, but we can use them in similar ways.

Many programs involved with the detection and control of pest insects make use of pheromones or food attractants.

The best known insect pheromones are the sex pheromones. These are usually produced by females to attract males for mating. The Lepidoptera (butterflies and moths) rely greatly on sex pheromone communication. When a female is ready to mate, she produces and releases a sex pheromone that air movement carries through the local environment.

Although sex pheromones of related pest species are chemically similar, males usually recognize the signals released by females of the same species, even in the presence of other species' pheromones. Responding males fly upwind toward a pheromone source until vision and/or touch aids in finally locating the female.

Many insect pheromones (or contributing components) have been identified and synthetically produced. We use these laboratory-produced attractants in various ways to manage insect populations.

Using pheromones in insect pest management

Attractants (synthetic pheromones) are often impregnated in a carrier like rubber or plastic that slowly releases the active component(s) over an extended period of time. When these lures are used in insect traps, the adult activity of specific insect pests can be monitored.

Food odors used as attractants (such as those used in monitoring apple maggot, cherry fruit fly, and walnut husk fly) are sometimes incorporated in the sticky coating applied to trap surfaces.

Pheromone-baited traps can be used to:

1. determine the presence or absence of a specific pest in a single field, orchard, plantation, nursery, or storage facility;
2. estimate the relative density of a given pest species at a single site; and
3. indicate the first emergence and peak flight activity of a certain species in a given area, to allow correct timing of an insecticide application.

Table 1 includes examples of these uses.

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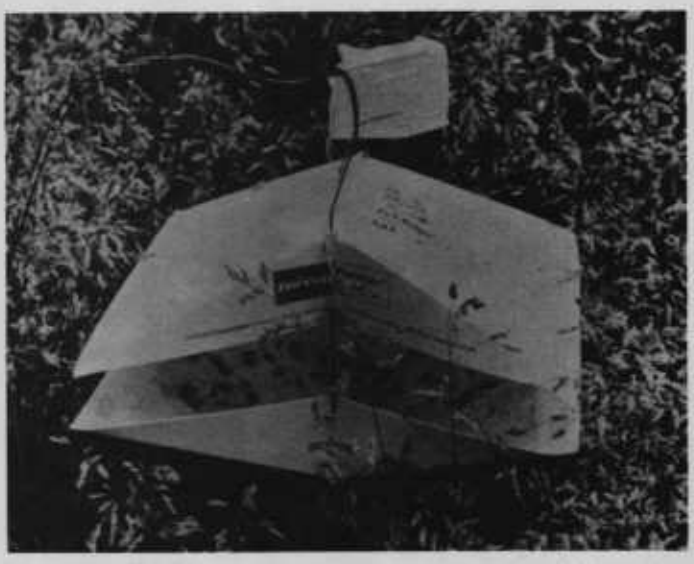

Figure 2.—This Pherocon 1C trap is monitoring the cranberry girdler (sod webworm) in a grass seed field.

Figure 3.—This Scentry delta trap is correctly positioned to detect male gypsy moths.

Areawide applications of sex attractants have been used to disrupt pheromone communication and prevent males from locating and mating with females. Such mating disruption programs reduce egg-laying and future larval infestations.

Examples of pests controlled by mating disruption programs include the tomato pinworm, pink cotton bollworm, and certain forest pests. This technique has not been successful against all pest species.

Pheromone traps in monitoring programs

Consider several important details when you plan to use pheromone traps in insect monitoring programs.

Storage. When you buy pheromone traps before you plan to use them, store them in a cool, clean, dry location. Freeze or refrigerate lures in their original sealed containers, to prevent release of the attractant before field use.

Traps in which the attractant is incorporated in the sticky coating—such as the Pherocon AM trap—also should be stored in sealed packages in a freezer or refrigerator.

Timing. Place your traps in an orchard or field at least 2 weeks before the first anticipated adult emergence of the season. This can be essential for proper interpretation of trap counts.

Placement and density. Place traps at locations specified by the manufacturer or by your Extension agent. General location within a field or orchard and details of specific placement (height, canopy position, direction of exposure, etc.) are critical (figures 1-3).

Unless otherwise indicated, trapping sites should include both border and interior areas of a field or orchard (figures 4-5).

If you want your traps to detect immigrating pests from neighboring areas, placement at downwind borders or near suspected areas of infestation is best. You can also place them in areas close to monitored fields or orchards to detect the source of immigrating pests.

If abandoned orchards, wild host plants, or grasslands that provide a reservoir for the pest you're monitoring are located within ¼ mile of the monitored crop, it is often necessary to place traps either in these areas or between them and the monitored crop.

These traps attract the "outside" male moths originating in the unmanaged area and reduce the number that enter traps in the monitored crop. Traps within the field or orchard then provide more accurate indications of local pest activity.

Always use the specified number of traps for the acreage you will monitor (usually 1 trap for every 2½ to 5 acres). Failure to use an adequate number of traps reduces monitoring efficiency and leads to incorrect conclusions.

Inspection and replacement. Check traps once or twice each week according to manufacturer or Extension Service recommendations. Tabulating and graphing counts provides a clear record of insect activity (figure 6). You can't accurately estimate first emergence or peak flight if you don't inspect your traps at least once a week.

Replace the sticky surfaces of traps if they become coated with dust, leaves, or insects. Replace lures at intervals specified by the manufacturer.

It is usually best to attach the lure to the "roof" of the trap with a straight pin. Insert the pin through the roof from the

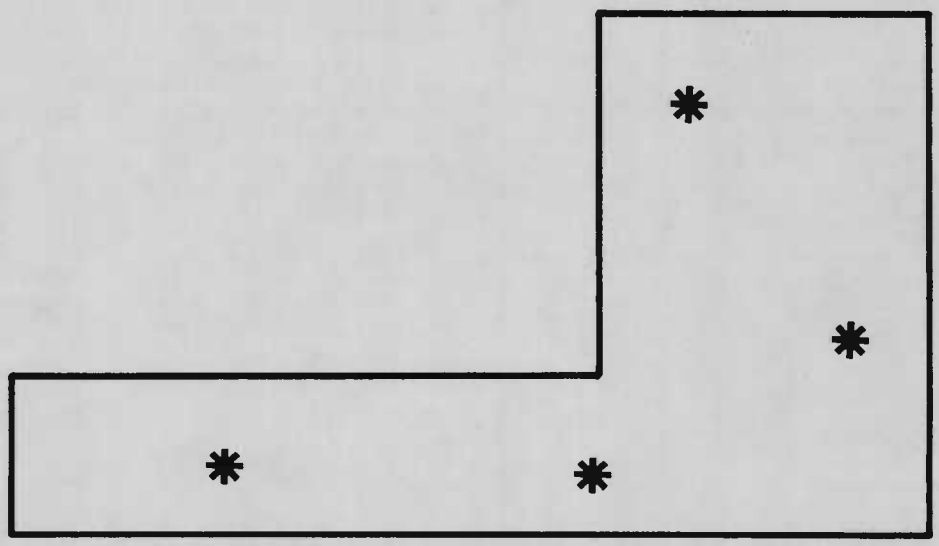

Figure 4.—Placing peach twig borer traps in an 8-acre orchard: a fourth trap is used to better monitor the irregularly shaped orchard.

Use pesticides safely!

- **Wear** protective clothing and safety devices as recommended on the label. **Bathe or shower** after each use.
- **Read** the pesticide label—even if you've used the pesticide before. **Follow closely** the instructions on the label (and any other directions you have).
- **Be cautious** when you apply pesticides. **Know** your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

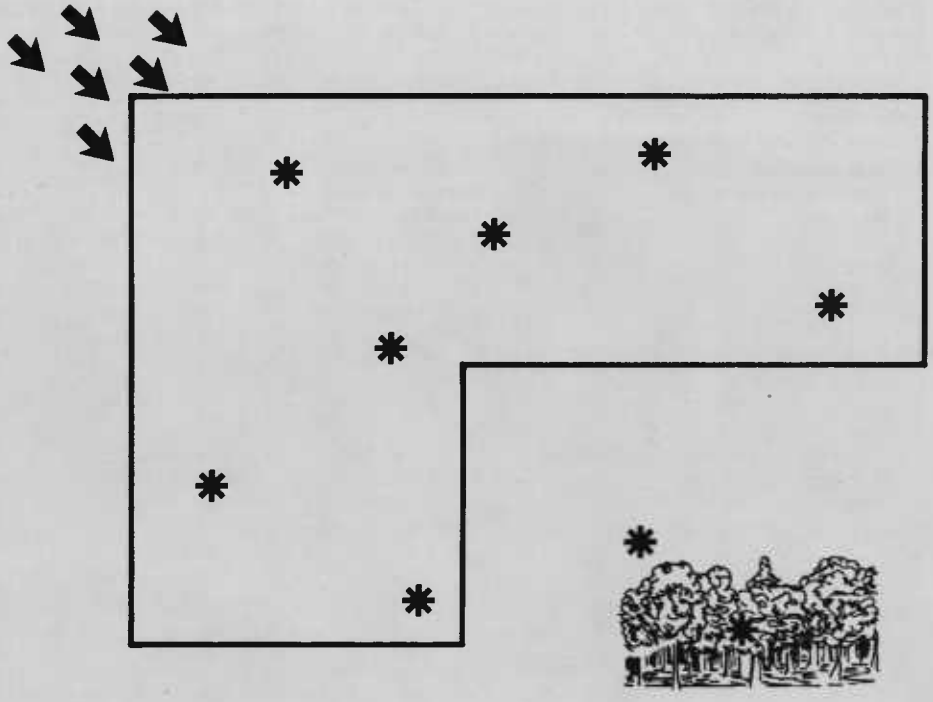

Figure 5.—Seven traps monitor filbertworm flight in this 22-acre filbert orchard. In addition, two extra traps monitor activity in a nearby abandoned orchard. Arrows at upper left indicate prevailing winds.

outside near the center, then push the lure onto the protruding point of the pin (inside the trap). Always remove old lures from the field or orchard when you replace them.

Interpretation. The use of pheromone trap data varies according to pest and crop. Capturing a single insect can sometimes signal the need for insecticide application (as for cherry fruit fly and apple maggot), or threshold estimates may suggest sprays are necessary only if a certain number of pests are trapped (peach twig borer, codling moth, and filbertworm).

For other pests (cutworms, loopers, and corn earworm), traps signal the need for subsequent sampling of eggs or larvae. Phenology models (models that describe insect development according to accumulated heat units) may use first or peak captures in pheromone traps as a "biofix" or starting point (as for codling moth and San Jose scale).

Environmental factors affect trap catches. Temperature, rainfall, and wind speed and direction influence attractant release and diffusion, as well as insect flight. Most insects fly and respond to pheromones only at certain times (dawn, midday, dusk, night, etc.), and then only if temperatures exceed a certain minimum level (often 50-60°F). Wind speed and direction determine the extent of insect migration from surrounding areas to traps within a field or orchard.

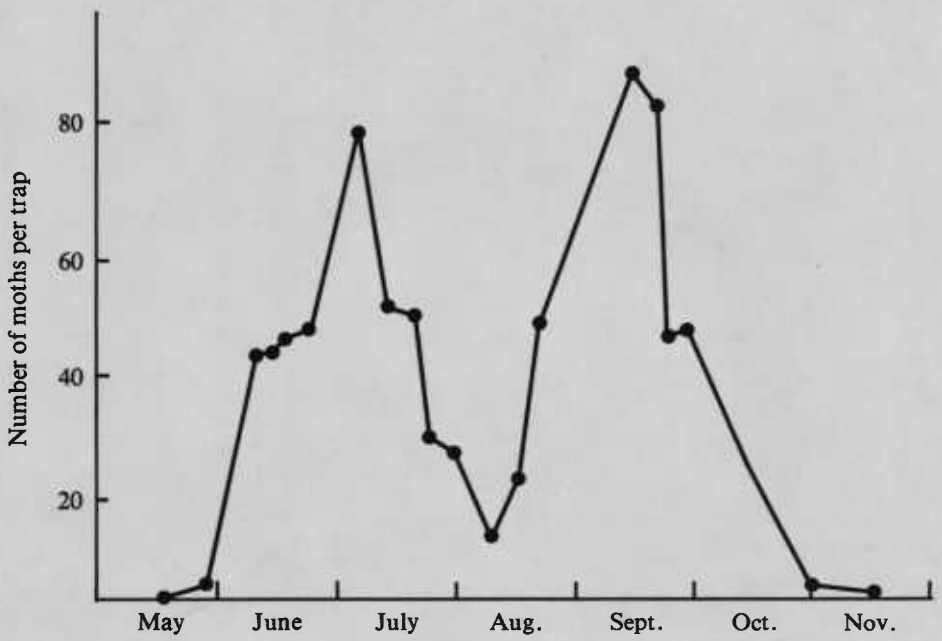

Figure 6.—Seasonal flight activity of obliquebanded leafroller in a north Willamette Valley orchard (1979). Plotting the counts of insects in traps provides a clear record of flight peaks and helps to determine pest management needs.

Pheromone traps for Oregon pests

Table 1 (pages 4-8) provides general information on the use of pheromone traps available for important insect pests of Oregon. Much of this information is based on the combined results of research conducted in other states or in Canada. It represents the best information available to the OSU Extension Service at this time.

Use the sections on control recommendations as *general guidelines*. Factors ranging from weather conditions to varieties and harvest dates will modify control decisions.

Commercially available pheromone traps

Pheromones and traps can be purchased for many pests. For some, kits are available that contain an appropriate number of

(Text continues on page 8.)

Table 1.—*Guidelines for using commercially available lures and pheromone traps to monitor insect pests in Oregon*

Pest	Trapping period	Trap number, placement	Manufacturer, trap style, lure replacement interval	Monitoring frequency	Interpretation, comments
Orchard and small fruit pests					
Apple maggot, *Rhagoletis pomonella* (Walsh)	June 15-Oct. 15	Place traps at 150-ft intervals around orchard borders. Hang 6 ft high on outside of canopy, south side. Place so there is no foliage within 1 ft of trap.	Bend Research Biolure: 20 wk Trece Pherocon AM: 3 wk (replace trap, which includes attractant)	2/wk	(See figure 7.) Apply insecticide as soon as possible after first fly capture in orchard. Repeat applications at 7- to 14-day intervals. Pherocon AM trap has been used effectively. See OSU Extension Service Fact Sheet 271, *The Apple Maggot in Oregon;* no charge for single copy; order from Bulletin Mailing Office, OSU, Corvallis 97331.
Blueberry maggot, *Rhagoletis mendax* Curran	June 1-harvest	4 traps per field. Hang at 45° angle (sticky side down), directly over bush.	Bend Research Biolure: 20 wk Trece Pherocon AM: 3 wk (replace trap, which includes attractant)	2/wk	(See figure 7.) The Pherocon AM trap has been used effectively in the eastern U.S. The blueberry maggot is not established in Oregon and is a quarantined pest. Submit suspect specimens to the Oregon Dept. of Agriculture, 635 Capitol NE, Salem 97310.
Cherry fruit fly (Western), *Rhagoletis indifferens* Curran	May 15-harvest	1 trap per 5 acres; minimum of 4 traps per orchard. Place 6 ft high on outside of canopy, south side.	Bend research Biolure: 20 wk Trece Pherocon AM: 3 wk (replace trap, which includes attractant)	2/wk	(See figure 7.) Apply insecticide up to 7 days after first fly capture. The Pherocon AM is the standard trap for cherry fruit fly.
Codling moth *Laspeyresia pomonella* (L.)	Petal-fall to harvest (or through Sept. 15)	1 trap per 2½ acres; minimum of 2 traps per orchard. Place border traps at 500-ft intervals. Hang 6 ft high on tree limb. Include traps near border areas.	Pest-Select Scentry Wing: 9 wk Bend Research Biolure: 20 wk Trece Pherocon 1CP: 4 wk	2/wk	First consistent emergence provides biofix for phenology models that aid in estimating spray timing. Preliminary estimate of economic threshold is 2 moths per Pherocon 1CP trap. See WSU Cooperative Extension Service publication EB 1072, *Codling Moth Control—A New Tool for Timing of Sprays* (single copy 25¢; order from Bulletins Office, Cooper Publications Bldg., WSU, Pullman, WA 99164), and OSU Agricultural Experiment Station Bulletin 634, *Integrated Pest Management of Insects and Mites Attacking Pears in Southern Oregon* (single copy, $3.25; order from Bulletin Mailing Office, OSU, Corvallis 97331).
Cranberry girdler, *Chrysoteuchia topiaria* (Zeller) (See also field and forest pest sections)	May 15-Aug. 15	2 traps per bog. Hang from stakes level with top of crop canopy.	Trece Pherocon 1C: 4 wk	1 or 2/wk	Only a preliminary estimate of economic threshold is available. Consider insecticide application if counts exceed 25 moths/Pherocon 1C trap. Apply first insecticide application at peak flight and again 10 to 14 days later.
Filbert leafroller *Archips rosanus* (L.)	May 30-Aug. 15	1 trap per 5 acres; minimum of 2 traps per orchard. Place 4 ft high on outside of canopy.	Trece Pherocon 1C: 5-6 wk	1/wk	Threshold is estimated as 20 moths per Pherocon 1C trap at peak. (Damaging larval stage occurs the following spring; larval sampling at that time may be more efficient than pheromone trapping of adults.)
Filbertworm, *Melissopus latiferreanus* (Walsingham)	June 15-Sept. 30	4 traps per first 10 acres, 1 per each additional 4 acres. Place in upper ⅓ of canopy.	Trece Pherocon 1C: 5-6 wk	2/wk	Estimated threshold is a cumulative total of 5 moths per Pherocon 1C trap. Treat up to 3 days after threshold is reached. Also consider control if trap counts exceed threshold in only some portions of the orchard.

Table 1.—*Guidelines for using commercially available lures and pheromone traps to monitor insect pests in Oregon (contd.)*

Pest	Trapping period	Trap number, placement	Manufacturer, trap style, lure replacement interval	Monitoring frequency	Interpretation, comments
Orchard and small fruit pests (contd.)					
Fruittree leafroller, *Archips argyrospilus* (Walker)	June 1-July 30	1 trap per 5 acres, minimum of 4 traps per orchard. Hang 6 ft high from tree limb at outer edge of canopy.	Pest-Select Scentry Wing: 8 wk Bend Research Biolure: 20 wk Trece Pherocon 1C: 4 wk	1 or 2/wk	Trap counts are not well-correlated with subsequent damage. Conduct a spring sampling for larvae (eggs overwinter) if previous season trap catches are significant.
Lesser appleworm, *Grapholitha prunivora* (Walsh.)	May 1-harvest	1 trap per 5 acres, minimum of 2 traps per orchard. Hang 6 ft high from tree limb at outer edge of canopy.	Trece Pherocon 1C: 4 wk	2/wk	Apply cover spray at peak flight.
Obliquebanded leafroller, *Choristoneura rosaceana* (Harris)	May 15-Sept. 30	1 trap per 5 acres. *Orchards:* Hang 6 ft high on outside of canopy. *Caneberries:* Hang on wire level with top of plants.	Pest-Select Scentry Wing: 8 wk Bend Research Biolure: 16 wk Trece Pherocon 1C: 4 wk	2/wk	*Filberts:* estimated threshold, 20 moths per Pherocon 1C trap per week. Apply insecticide 2-4 days after peak flight. (Traps may attract males from surrounding areas.) *Caneberries:* Apply insecticide 10-14 days after peak flight. This pest will also be captured in orange tortrix traps (see next entry).
Orange tortrix, *Argyrotaenia citrana* (Fernald)	Mar. 1-harvest	1 trap per 5 acres. *Orchards:* Hang 6 ft high on outside of canopy. *Caneberries:* Hang on wire level with top of plants.	Bend Research Biolure: 26 wk Trece Pherocon 1C: 4 wk	2/wk	Apply insecticides 10-14 days after peak flight. Flight periods may span entire season; larval sampling may be necessary to determine population levels and spray needs. Obliquebanded leafrollers will also be captured in orange tortrix traps.
Oriental fruit moth, *Grapholitha molesta* (Busck)	Apr. 1-harvest	1 trap per 5 acres; minimum of 2 traps. Hang 6 ft high on northeast portion of tree, 1 to 2 ft in from perimeter of canopy.	Pest-Select Scentry Wing: 8 wk Bend Research Biolure: 20 wk Trece Pherocon 1C: 4 wk	2/wk	Apply cover spray at peak flight (2-3 weeks after first capture).
Peachtree borer, *Synanthedon exitiosa* (Say)	June 1-Sept. 15	1 trap per 2½ acres, minimum of 2 traps per orchard. Hang traps on trunks; place 3 ft high.	Pest-Select Scentry Wing: 20 wk Trece Pherocon 1C: 4 wk	1/wk	Apply trunk sprays 3 days after first capture; repeat application 14 days later.
Peach twig borer, *Anarsia linetella* Zeller	May 1-harvest	1 trap per 2½ acres, minimum of 2 traps per orchard. Hang 6 ft high on tree limb.	Trece Pherocon 1C: 2 wk	1 or 2/wk	Canadian research indicates threshold for first generation, 2 moths/Pherocon 1C trap; threshold for second generation, 5 moths/trap. Apply insecticide 10 days after threshold is reached.
San Jose scale, *Quadraspitiotus perniciosus* (Comstock)	May 1-Sept. 30	Trapping density not established. Use at least 2-4 traps per orchard. Hang 6 ft high on tree limb.	Trece Pherocon tent: 4-6 wk	2/wk	Use traps together with phenology models to determine spray timing. Sticky tape traps can be used to sample crawlers (immatures).
Spotted tentiform leafminer, *Phyllonorycter (=Lithocolletis)* spp.	Mar. 1-Nov. 30	2 traps per orchard. Place traps 6 ft high on tree limb near edge of canopy.	Pest-Select Scentry Wing or Scentry Delta: 6 wk Trece Pherocon 1C; 4 wk	1/wk	Correlation between trap catches and larval mines is low. Follow trap monitoring by checking foliage; threshold estimated at 1-3 mines per leaf.

Table 1.—*Guidelines for using commercially available lures and pheromone traps to monitor insect pests in Oregon (contd.)*

Pest	Trapping period	Trap number, placement	Manufacturer, trap style, lure replacement interval	Monitoring frequency	Interpretation, comments
Orchard and small pests (contd.)					
Strawberry crown moth, *Synanthedon bibionipennis* (Boisduval)	May 20-Aug. 15	2 traps per 5 acres; 3 traps per 10 acres; 4 traps per 20 acres.	Trece Pherocon 1C: 4 wk	2/wk	Apply insecticides within 12 days of first consistent flight activity (3-4 moths per trap in 3-4 days). Repeat application in 14-17 days if traps continue to catch moths. See "Strawberry Crown Moth" supplement in *Pacific Northwest Insect Control Handbook,* current edition; $15.00 a copy from Bulletin Mailing Office, OSU, Corvallis 97331.
Walnut husk fly, *Rhagoletis completa* Cresson	July 15-Oct. 1	5 traps per orchard. Place 10 to 15 ft high (above lowest foliage) on north side of trees.	Bend Research Biolure: 20 wk Trece Pherocon AM: 3 wk (replace trap, which includes attractant)	2/wk	(See figure 7.) Pherocon AM trap has been used successfully. Apply insecticide within 10 days after counts show continuous rise for 2 or 3 days. Subsequent insecticide sprays also necessary. See OSU Extension Service Fact Sheet 168, *The Walnut Husk Fly;* no charge for single copy; order from Bulletin Mailing Office, OSU, Corvallis 97331.
Field crop and vegetable pests					
Alfalfa looper, *Autographa californica* (Speyer)	Apr. 1-Aug. 30	1 trap per 5 acres, minimum of 2 per field. Hang from stake at level even with top of crop.	Bend Research Biolure: 20 wk Trece Pherocon 1C: 4 wk	1/wk	Follow trap captures by sampling for eggs and/or larvae.
Beet armyworm, *Spodoptera exigua* (Hubner)	Apr. 1-Aug. 30	1 trap per 5 acres, minimum of 2 per field. Hang from stake at level even with top of crop.	Trece Pherocon 1C: 4 wk	1/wk	Sample for larvae, beginning 7-14 days after first moths are trapped.
Black cutworm, *Agrotis ipsilon* (Hufnagel)	Apr. 1-harvest	1 trap per 5 acres, minimum of 2 per field. Hang from stake at level even with top of crop.	Trece Pherocon 1C:4 wk	1/wk	Sample for larvae, beginning 7-14 days after first moths are trapped.
Cabbage looper, *Trichoplusia ni* (Hubner)	Apr. 15-Aug. 30	1 trap per 5 acres, minimum of 2 per field. Hang from stake at level even with top of crop.	Pest-Select Scentry Wing: 9 wk Bend Research Biolure: 16 wk Trece Pherocon 1C: 4 wk	1 or 2/wk	Sample for eggs as soon as moths are captured, or begin larval sampling 1 week after moths are trapped.
Corn earworm, *Heliothis zea* (Boddie)	May 1-Sept. 15 (presilking through harvest in corn)	2 traps per field. Attach to tall stake so that bottom opening is level with top of crop canopy.	Pest-Select Scentry Heliothis: 7-10 days Bend Research Biolure: 16 wk Trece Pherocon 1C: 4 wk	2/wk	If any moths are captured, sample silks for eggs (beginning at 10% silk). Repeated insecticide applications are needed when eggs are present.
Cranberry girdler (= Sod webworm), *Chrysoteuchia topiaria* (Zeller)	June 10-June 20	*Grass seed fields:* 1 trap per 20 acres; minimum of 2 traps per field. Stake at level even with top of crop canopy. Place where damage usually occurs first (well-drained ridges, etc.); rotate to new sites daily.	Trece Pherocon 1C: lure replacement unnecessary.	Check and move traps daily (also replace sticky trap bottoms)	*Grass seed fields:* Varieties differ greatly in cranberry girdler susceptibility; an *average* of 40-50 moths *per trap per day* for 5 or more days (June 10-June 20) usually indicates a damaging population. Apply insecticides for adult control, usually June 15-June 20.

Table 1.—*Guidelines for using commercially available lures and pheromone traps to monitor insect pests in Oregon (contd.)*

Pest	Trapping period	Trap number, placement	Manufacturer, trap style, lure replacement interval	Monitoring frequency	Interpretation, comments
Field crop and vegetable pests (Contd.)					
Diamondback moth, *Plutella xylostella* (L.)	May 1-Sept. 15	1 trap per 5 acres, minimum of 2 traps per field. Hang from stake at level even with top of crop.	Trece Pherocon 1C: 4 wk	1/wk	Sample for eggs and larvae beginning 1 week after first moths are trapped.
Variegated cutworm, *Peridroma saucia* Hubn.	May 1-Sept. 15	1 trap per 5 acres, minimum of 2 traps per field. Hang from stake at level even with top of crop.	Trece Pherocon 1C: 4 wk	1/wk	Sample for eggs and larvae beginning 1 week after first moths are trapped.
Forest and ornamental pests					
Cranberry girdler, *Chrysoteuchia topiaria* (Zeller)	May 15-Aug. 30	*For conifer nurseries:* 1 trap per 5 acres; minimum of 2 traps per field. Suspend traps on stakes 20 inches above.	Trece Pherocon 1C: 4 wk	2/wk	Apply insecticides for adult and larval control when traps begin to capture several moths per day. Also consider trap counts and spray programs in nearby grasslands.
Douglas-fir tussock moth, *Orgyia pseudotsugata* (McDunnough)	Aug. 10-Oct. 1	Trap density not established except in U.S. Forest Service monitoring program. Hang traps as high as practical on branch. Use 2 traps per site.	Bend Research Biolure: 12 wk Pest-Select Scentry Delta: 12 wk Trece Pherocon 1I: 12 wk	1/wk	Trap counts indicate presence or absence only. If you're interested in trapping to monitor population density, contact director of insect and disease management, Oregon Dept. of Forestry, 2600 State St., Salem 97301.
European pine shoot moth, *Rhyacionia buoliana* (Schiffermuller)	*East of Cascades,* May 1-June 15; *West of Cascades,* May 15-July 15	Minimum of 1 trap per 4 acres. Place in upper ⅓ of small trees or 5-7 ft high. Hang in outer portion of canopy.	Bend Research Biolure: 16 wk Trece Pherocon 1C or Pherocon 1I: 4-6 wk	1/wk	Submit captured moths (in traps) to Oregon Dept. of Agriculture (635 Capitol NE, Salem 97310) for identification. Apply insecticide 10 days after adult captures.
Gypsy moth, *Lymantria dispar* (L.)	June 20-Aug. 30	Trap densities not established except for Oregon Dept. of Agriculture detection program.	Pest-Select Scentry Delta: 4-6 wk Bend Research Biolure: 26 wk Trece Pherocon 1I: 4-6 wk	1/wk	Submit captured moths (intact on trap) to Oregon Dept. of Agriculture (635 Capitol NE, Salem 97310). Larval control programs are conducted the year following trap captures.
Western pine shoot borer, *Eucosma sonomana* Kearfott	Mar. 15-May 15	Trap densities not established. Use at least 2 traps per site. Hang 3-6 ft high *in pine foliage.*	Pest-Select Scentry Delta: 8 wk Bend Research Biolure: 16 wk	1/wk	Pest distributed primarily east of Cascades. Trap counts merely indicate presence or absence of this pest. Plantation lodgepole and ponderosa pines are its main hosts.
Western spruce budworm, *Choristoneura occidentalis* Freeman	July 1-Aug. 15	Trapping density not established except in U.S. Forest Service programs. Hang traps as high as practical on branch. Use at least 2 traps per site.	Bend Research Biolure: 12 wk	1/wk	Trap counts indicate presence or absence only.
Other pests					
Angoumois grain moth, *Sitotroga cerealella* (Olivier)	Year-round in storage facilities.	1-2 traps per storage facility.	Bend Research Biolure: 20 wk	1/wk	If moths are trapped, sample stored commodity for larvae; control as needed.
Greenhouse whitefly, *Trialeurodes vaporariorum* (Westwood)	Year-round in greenhouses.	See comments. Stake traps among plants on benches.	Trece Pherocon AM (without attractant)	2/wk (see comments)	2-4 traps per house can indicate whitefly presence. Traps placed every few feet along benches aid in control ("trap-out"). No chemical lure is used. Replace trap when sticky coating becomes covered with insects or debris.

Table 1.—*Guidelines for using commercially available lures and pheromone traps to monitor insect pests in Oregon (contd.)*

Pest	Trapping period	Trap number, placement	Manufacturer, trap style, lure replacement interval	Monitoring frequency	Interpretation, comments
Other pests (contd.)					
Indian meal moth, *Plodia interpunctella* (Hubner)	Year-round in storage facilities.	1-2 traps per storage facility.	Pest-Select Scentry Wing: 12 wk Bend Research Biolure: 16 wk Trece Pherocon 1C: 4-6 wk	1-2/wk	If moths are trapped, sample stored commodity for larvae; control as needed.
Raisin moth, *Cadra figulilella* (Gregson)	Year-round in storage facilities.	1-2 traps per storage facility.	Bend Research Biolure: 16 wk	1-2/wk	If moths are trapped, sample stored commodity for larvae; control as needed.

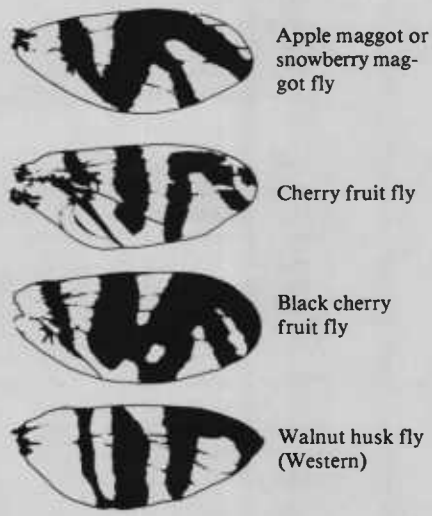

Figure 7.—These wing markings distinquish four fruit flies commonly attracted to traps (reproduced by permission of Trece, Inc., Palo Alto, Cal.).

components (traps, lures, hangers, and replacement liners) to monitor a single field or orchard.

For other pests, separate purchases of individual components are necessary. Current traps are constructed of plastic or cardboard in a variety of colors, shapes, and sizes (see figures 1-3).

Actual trapping may be accomplished by sticky coatings (for example, Tanglefoot or Stick-um Special) or by funnel-shaped entrances from which insects can't escape.

Attractants are occasionally incorporated in the sticky material applied to trap surfaces (as in the Pherocon AM trap), but more frequently a separate lure is provided. It is usually best to attach the lure to the "roof" of a trap with a straight pin, but you can simply place them on the sticky floor of most traps.

Although many types of traps and carriers are available, it is important to use the proper trap for a specific insect. Trap color, shape, and size influence trapping efficiency.

It is usually not wise to use homemade traps. Even though they may capture target pests, standard interpretations of counts may not be possible, and your control needs may remain unclear.

Commercial manufacturers of pheromones and traps are listed alphabetically below. (Trece, Inc., is the supplier of lures and traps formerly marketed by Zoecon. Pest-Select was formerly known as Albany International.) You can buy them directly from the manufacturers (a minimum order may be required), from wholesale distributors, or from local agricultural chemical dealers who stock traps and carriers for common pests.

Iselin, Inc. (4520 S. Juniper, Tempe, Arizona 85282, phone 602-897-2051) is a distributor for many traps and lures. No minimum order is required for purchases from Iselin.

Bend Research, Incorporated
64550 Research Road
Bend, OR 97701
phone 503-382-4100

Pest-Select
Purchase from:
United Agri Products
P. O. Box 2357
Fresno, CA 93745
phone 209-268-9466

Trece, Inc. (formerly Zoecon Corp.)
635 S. Sanborn Rd, Suite 17
Salinas, CA 93905
phone 408-758-0204

This publication was prepared at Oregon State University by Richard A. Weinzierl, Extension pest management assistant; Glenn C. Fisher, Extension entomology specialist; and James D. Calkin, Extension pest management specialist. The use of trade names in this publication does not mean any endorsement of such products by the OSU Extension Service, and the fact that other products are not mentioned does not mean any discrimination against those products.

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