

scaffolds

Update on Pest Management
and Crop Development

F R U I T J O U R N A L

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SIREN SONG

THE ABCs OF
PHEROMONE
MATING
DISRUPTION
(Greg Krawczyk,
Pennsylvania

State Univ., Biglerville)



❖❖ The new technology called mating disruption (MD) has emerged as a very useful and powerful method in insect management. According to the Random House Webster's College Dictionary (1997) a "pheromone is any chemical substance released by an animal that serves to influence physiology or behavior of other members of the same species". In the insect world a sex pheromone is used to help one sex (typically the male in insects) orient toward and find the other gender for mating. Despite the minute amounts being released by the female moth, the sex pheromones can be detected over hundreds of yards on wind currents, and by flying upwind in the pheromone plume, the male can almost always find the female.

The current Pennsylvania Tree Fruit Production Guide 2008-2009 includes an updated chapter entitled "Using pheromones for mating disruption" (p.183). Over the last 10 years this technology of practical application of insect sex pheromones to control pests in fruit orchards becomes a very familiar term for most commercial Pennsylvania fruit growers. The disruption of insect communication by pheromones takes place when enough artificial sources of pheromone are placed in an area that the probability of a female being found by a male, mating, and laying viable eggs is reduced below the point where economically signifi-

cant damage occurs. Since the sex pheromones are highly species-specific and only individuals of the same species respond to the pheromone volatile in the air, mating disruption is probably one of the most selective methods to control the target pest. But because of difficulties in managing high populations of pests, mating disruption programs should not

be viewed as stand-alone strategies, but rather as one tactic within the toolbox of pest management options. In fruit systems, mating disruption pheromone materials are available for the control of codling moth, oriental fruit moth, peachtree borer, lesser peachtree borer, as well as for some leafroller species and some other borers.

The commercially available MD materials generally consist of some kind of reservoir (dispenser), a carrier and the sex pheromone. Although some technologies utilize a low number of pheromone release points, in most cases the pheromone is being released from a high

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number of points per unit of area. The number of dispensers can vary from 1 to 40,000 or more release points per acre. The flowable formulations of some pheromones (sprayable pheromones) can be applied as a regular spray using standard equipment that is the same as for pesticide applications. The most common MD materials can be grouped into a number of different categories.

Hand-Applied Dispensers are the most popular and commonly used form of mating disruption. The standard system includes an impermeable reservoir fitted with a permeable membrane for regulating pheromone release. Pheromone-impregnated polymer spirals, ropes, dispensers, or tubes are currently the most often used products. Wires, clips, or circular twin tubes allow these dispensers to be twist-tied, clipped, or draped directly onto the plant. The large reservoirs utilized in these products allow for long residual activity ranging from 60–140 days. These long residual properties of MD products may allow early season applications to suppress mating for most or all of the growing season, depending on the type of dispenser and pest species. Application rates vary from one to several dispensers per tree (or 10–400 dispensers per acre) and can be labor-intensive. The most common hand applied MD products include:

a) Codling moth control:

- Isomate C TT and Isomate C Plus products (from CBC America/Pacific Biocontrol, Vancouver, WA). The Isomate C TT should be applied at the rate of 200 dispensers/acre, while the Isomate C Plus should be applied at the rate of 400 dispensers/acre. Both products provide CM control for 120+ days and should be applied before CM biofix.

b) Oriental fruit moth control:

- Season-long control will be provided by Isomate M Rosso applied at the rate of 150-200 dispensers/acre depending on the pest pressure, active for 150+ days [Note: not registered in NY];

- Short-active materials include Isomate M 100 applied at the rate of 100 dispensers/acre, active for 90–100 days, Hercon Disrupt OFM applied at 100

dispensers/acre, and Hercon Disrupt OFM mats (from Hercon Environmental, Emigsville, PA) applied at the rate of 10 mats/acre, active for 90 days. No short-active materials will provide adequate control during the entire season; therefore, depending when they are being applied (earlier or late during the season), additional insecticide applications may be necessary to control OFM populations earlier or during the later part of the season.

c) Control of codling moth and oriental fruit moth:

- Two products are available for simultaneous control of codling moth and oriental fruit moth: CheckMate CM-OFM Duel (from Suterra LLC, Bend OR) and Isomate CM/OFM TT. Since both products contain sex pheromones of both targeted species, they are highly recommended for apple/pear orchards where both internal fruit feeders (CM and OFM) are present. The effective recommended rate varies from 175–200 dispensers per acre. Both products should be placed in the orchard before the occurrence of the CM biofix.

d) Peachtree/lesser peachtree borer control:

- Currently, two products, Isomate P and Isomate LPTB, are available to control borers on peaches and other stone fruit. Isomate LPTB at the rate of 100 dispensers is registered for the con-

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trol of lesser peachtree borer, while the Isomate P (at the rate of 100 dispensers/acre) and Isomate LPTB at the higher rate of 200 dispensers/acre should provide good control of peachtree borer.

e) Other products:

- A number of other MD products sometime utilizing completely new or different approaches of delivering pheromones are being evaluated and/or utilized in other fruit-growing regions. The examples of such products include: CideTrac CM, CideTrac OFM products from Trécé, Inc (Adair, OK), NoMate CM and NoMate OFM from Scentry Biologicals (Billings, MT), SPLAT Cydia from ISCA Technologies (Riverside, CA) or Exosex CM and Exosex OFM from Exosect Limited (Winchester Hampshire, UK).

Often the cost for MD products tends to be relatively high, especially taking into account the fact that mating disruption is target-specific and works only against the target, usually one pest species. To control multiple pest species, often multiple applications of various MD products are necessary. Additionally, under high pest pressure situations, supplemental insecticides might be needed to provide acceptable control of the MD-targeted pest.

Sprayable Pheromones

Microencapsulated pheromones are enclosed in a polymer capsule that controls the pheromone release rate. These capsules are small enough and durable enough to be applied in water through normal airblast sprays in the same manner as conventional pesticides. This makes them very attractive for use by many fruit growers. Residual activity is generally up to 4–6 weeks, which gives them some flexibility in pest management programs but also means they may need to be reapplied several times in a season for a target pest. Residual activity may be reduced by rainfall soon after application and a sticker-type spray adjuvant is often recommended. Currently, for the growers on the East Coast, the only available effective sprayable pheromone is registered for the control of oriental fruit moth: CheckMate OFM-F. Several formulations for codling moth and several species of leafrollers

have been tested and sold commercially, but they have not been tested adequately under eastern US weather conditions. Another MD technology utilizing Ultra-Low Volume (ULV) pheromone application, while appearing effective in controlling codling moth, requires specialized delivery equipment and therefore is so far being utilized on a very small scale, mostly in experimental settings.

Other Methods

Many other methods of mating disruption are being developed and/or tested in the eastern fruit growing regions, but most of them have not been proven commercially yet. These include:

- Pheromone-impregnated flakes: Hercon Disrupt Micro Flakes OFM and Hercon Disrupt Micro Flakes CM applied aerially or with specialized ground equipment at the rate of 35,000–40,000 flakes/acre;
- “Attract and Kill” methods of applying droplets of pheromone to foliage by hand (i.e., Last Call OFM, Last Call CM from Aptiv, Inc.) that also contain pyrethroids to kill attracted males;
- High-emission dispensers such as aerosol “puffers” (i.e., Puffer CM and Puffer OFM from Suterra LLC.) or polymer bags loaded with large doses of pheromone (i.e., MSTRS OFM from Ag-Bio Inc., Ames, IA).

Some of these products may either already have a registration or are expected to become commercially available in the near future.

Since mating disruption products do not kill insects, special considerations are necessary for deciding what type of mating disruption product, rate, and application method are being used. Borders of disrupted blocks are often at higher risk because of pest mating occurring outside the disrupted area, and therefore efficacy is increased with the size of the block treated. Peach and apple orchards adjacent to each other benefit from disruption in both crops for pests like the oriental fruit moth. Under normal weather conditions, the pheromone plume, due to its weight, tends to descend from the point of release. The importance of the proper placement

continued...

of the dispensers cannot be overvalued; placement of release points as high as possible (dispensers, ties, flakes etc.) will help in providing a good distribution of the pheromone and better disruption of moths' communication. Also, the residual activities of many of these products vary greatly; therefore, it is extremely important to maintain a careful insect monitoring system in orchards so no unexpected "surprises" will happen. Properly maintained pheromone traps should be able to provide excellent indirect information related to the efficacy of applied MD programs.

Although mating disruption can work in smaller, isolated orchards, the best results are achieved using this technology in large area-wide settings. During last two years, more than 1,200 acres of fruit orchards in Pennsylvania have been participating in the area-wide CM and OFM mating disruption project sponsored by the grant from the Pennsylvania Department of Agriculture and fruit growers from the State Horticultural Association of Pennsylvania. Large-scale mating disruption implementation trials have yielded significant reductions in pesticide usage while keeping crop damage levels acceptably low. During 2007 a number of smaller, isolated fruit farms also joined the area-wide pest control project and initiated smaller whole-farm mating disruption programs, with all fruit blocks within a single farm being treated with some kind of MD material. Despite the smaller areas and a slightly different approach, this group of growers was also able to drastically reduce the insecticide programs on their farms and still maintain excellent fruit quality at harvest.

For more info about mating disruption programs please contact Dr. Greg Krawczyk, PSU Extension Tree Entomologist, at 717-677-6116 or by e-mail: gxk13@psu.edu.

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GET
ON
LINE

TRAC SOFTWARE 2008
NOW AVAILABLE
(Julie Carroll, IPM,
Geneva)

❖❖ In 2008, we will not be sending out CDs of the software. Instead the software is available online. Each year, updated Chem-Table information will be posted with instructions for use.

Trac Software is available for downloading at the following website: <http://www.nysipm.cornell.edu/trac/downloads/>

Apple Computer users, be aware that we have found a bug on the SprayData sheet Add More Rows button and are working to solve this asap. Notice of this will be posted on the website.❖❖

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PHENOLOGIES

Geneva: All dormant

Highland:

Apple -Ginger Gold - Silver Tip

Apple - McIntosh - Silver Tip

Apple - Delicious - Dormant

Pear - Bartlett / Bosc - Swollen bud

Sweet cherry - Dormant

Peaches - Swollen bud

Plum - Dormant

EARLY
RISERS

APPLE SCAB
WARNING
(Dave Rosenberger,
Plant Pathology,
Highland)

❖❖ Over-wintering leaves collected from our research orchard at the Hudson Valley Lab on Monday morning were actively releasing ascospores (49 spores in the tower shoot) and showed 17% mature spores in the squash mount assessments. These are unusually high numbers considering that our McIntosh trees have not yet reached green tip (although they will within the next two days). We usually consider 15% mature spores and/or 50–60 spores in the tower discharge test as our “economic threshold” for commercially significant ascospore discharge.

Early maturation of ascospores in the Hudson Valley this spring was probably facilitated by the extended snow cover during winter that prevented freeze-drying of the leaf litter and the frequent rainfall that has kept the leaf litter wet ever since the snow cover disappeared.

A extended period of showers has been predicted for the end of this week in southeastern NY, so Hudson Valley growers should apply a protectant fungicide prior to the rain. A copper spray applied to suppress fire blight will provide the same scab protection as a mancozeb spray.

If orchards reach green tip and are not protected with a fungicide prior to the rain, then Vanguard or Scala should be applied after the rain. Both of these fungicides can provide up to 72 hr of post-infection activity counting from the start of the rains. However, complete spray coverage is essential when spraying after the rain because redistribution of fungicides will not compensate for incomplete spray coverage when sprays are applied on a post-infection basis.❖❖

SHADES
OF
GRAY

BLACK ROT OR SOOTY
MOLDS?
(Dave Rosenberger,
Plant Pathology, Highland)

❖❖ Several Hudson Valley growers have contacted me in recent weeks concerning black discoloration around pruning cuts that were made on apple trees prior to the 2007 growing season. These growers have been concerned that the discoloration may represent the beginning of a black rot canker, and they questioned whether the discolored portions of the branches should be removed. In most cases, the discoloration observed has extended down the trunk below pruning cuts (Fig. 1).



Fig. 1 Sooty mold

The black discoloration on pruning cuts and on the surface of bark below these cuts is almost always caused by non-pathogenic sooty molds that grow on sap that oozed from pruning cuts made in previous years. The xylem in the older wood exposed by pruning cuts sometimes fails to heal in trees that have been damaged by cold injury and/or invasion of basidiomycete fungi. These cuts may appear wet during the spring after pruning. Sap may ooze



Fig. 2 Leaking cut

either from the center portion of the cut limb (Fig. 2) or from a distinct ring of injured xylem (Fig. 3). The exposed

continued...



Fig. 3 Leaky cut

xylem may continue to ooze for more than a year after cuts have been made even though the tree produces a healthy callus around the edges of the pruning wound (Fig. 4).

The oozing sap is a nutrient source for sooty



Fig. 4 Callused leak

molds. Sooty molds include numerous species of saprophytic fungi that grow on plant surfaces whenever they can access free nutrients. Pear growers are familiar with sooty molds because they commonly grow on honeydew from pear psylla and can blacken fruit on psylla-infested trees. The sooty molds cause no direct damage to trees.

Black rot cankers caused by *Botryosphaeria obtusa* can also originate at pruning cuts, especially when cuts are made through limbs damaged by cold injury or xylem-inhabiting basidiomycetes.

The multi-year process that leads to development of black rot cankers and other apple tree cankers has been described in detail in the most recent issue of the New York Fruit Quarterly and will not be repeated here.

One can determine the difference between a black rot canker and a sooty mold infestation by observing the edge of the pruning cut for callus formation. If a distinctive callus is evident around last year's pruning cuts as shown in Fig. 4, then the wound is healing normally and the tree is unlikely to develop a black rot canker. Where black rot is present, dead bark will usually extend an inch or more above or below the cut. The dead bark may appear sunken and/or scaly.

Where extensive discoloration is present below a pruning cut, one can check for green tissue beneath the discoloration by making a small cut with a pocket knife. If the cut reveals green tissue beneath the discoloration, then the discoloration is most likely caused by sooty molds and no corrective action is required. ❖❖

PEST FOCUS

Highland:
Green fruitworm
 flight began 4/1. **Pear
 psylla** egg laying has
 begun.

UPCOMING PEST EVENTS

	<u>43°F</u>	<u>50°F</u>
Current DD accumulations (Geneva 1/1–4/7/08):	69	26
(Geneva 1/1–4/7/2007):	108	41
(Geneva "Normal"):	102	45
(Geneva 1/1–4/14 Predicted):	112	41
(Highland 3/1–4/7/08):	48	8
<u>Coming Events:</u>	<u>Ranges (Normal ±StDev):</u>	
Green fruitworm 1st catch	52–124	13–55
Pear psylla adults active	31–99	8–34
Pear psylla 1st oviposition	40–126	11–53
McIntosh at silver tip	55–111	17–43

NOTE: Every effort has been made to provide correct, complete and up-to-date pesticide recommendations. Nevertheless, changes in pesticide regulations occur constantly, and human errors are possible. These recommendations are not a substitute for pesticide labelling. Please read the label before applying any pesticide.

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