Mating disruption became commercially available in the early 1990s, and was adopted by many Utah growers about a decade later. Use of this pest management technology can be daunting due to high up-front costs and monitoring requirements; however, after two to three seasons of use, the cost of mating disruption is the same or even less than conventional pest management. It is a viable and important alternative for larger-acreage orchardists.

Like many moth species, the female peach twig borer emits a species-specific pheromone which attracts male moths for mating. Males easily follow the pheromone “plume” directly to the female. When an orchard is saturated with synthetic pheromone, mating is “disrupted” as the males are limited in their ability to find females.

Two theories have been proposed to explain how mating disruption delays or prevents mating:

- “Competitive attraction,” where males follow the false plumes at the expense of finding a mate
- The males’ ability to find females has been blocked by the pheromone-saturated air, and they are unable to follow any plume

Entomologists at Michigan State University (MSU) suggest that the primary mechanism is competitive attraction.
In their research, they repeatedly saw male moths approach pheromone dispensers, reducing their success of locating female mates (Miller 2010). The MSU research also showed a secondary response where males were unable to follow any pheromone plume due to sensory overload. They found that the males recovered the next day after flying out of the saturated orchard. The result of these two mechanisms is that mating is delayed.

A female that has not mated after three days has half the number of viable eggs. As a result, mating disruption alone is not a successful pest control strategy in orchards with high moth populations. Chance encounters and mating are known to occur under mating disruption where pest pressure is high.

The good news is that, after several seasons of using mating disruption, the peach twig borer population declines, and mating and fruit injury are prevented.

**WHO CAN USE MATING DISRUPTION**

Before using mating disruption, be sure you have the time and resources for a proper monitoring program, and a source of information (consultant, agriculture company representative, Extension) when questions arise.

Peach twig borer mating disruption requires large, contiguous areas of orchard to work successfully.

- **Ten acres** of solid peach, nectarine and/or apricot trees is the minimum size.
- Ideally, border edges are minimized (i.e., mating disruption works better in a square-shaped orchard than in a long, narrow rectangular orchard).
- Expansion of mating disruption to neighboring orchards will improve effectiveness.
- Newly planted orchards are not ideal for mating disruption because the pheromone quickly dissipates due to lack of foliage.

Know your initial twig borer population. If you have never used mating disruption, the orchard may have high pest pressure. In this case, be prepared to apply well-timed insecticide treatments as you would without mating disruption for the first one to two seasons. Once the population declines, it is possible to use mating disruption with few, or even without, supplemental treatments.

**MATING DISRUPTION PRODUCTS**

Currently, only hand-applied dispensers are available for peach twig borer, although manufacturers are working on releasing a “Puffer” version. Hand-applied dispensers are applied at a rate of 150 – 400/acre, and puffers at 1-2 canisters/acre.

**Brands that are most commonly used in Utah**

**Checkmate PTB-XL** is the industry standard for peach twig borer. It is a clip-on, flat membrane dispenser. These dispensers last 90 days in the orchard.

**Isomate-PTB TT** is formed of “twin tubes” (TT) that contain the pheromone. The dispenser is looped over branches. The pheromone lasts the duration of peach season in Utah.

The two brands of mating disruption dispensers do not last the same amount of time. The Checkmate brand, although very effective, only lasts 90 days. An average peach season lasts about 120 days. Pheromone from the Isomate brand does last the full season.

Recent research at USU (2011) compared the Checkmate and Isomate products, and found that there was no difference in the amount of shoot or fruit injury in the orchard between the two brands. There was, however, a significant difference in trap catch, where the monitoring traps in the Isomate trial attracted more moths than the monitoring traps in the Checkmate trial. These results show that unlike with codling moth, there is no clear relationship between trap catch and injury to the tree.
The timing of when to apply the mating disruption dispensers will depend on which brand you choose. 

**Isomate** dispensers should be placed in the orchard approximately 1 month before predicted biofix (first male flight) to allow for full pheromone saturation in the orchard before moths emerge.

**Checkmate** dispensers should be applied on approximately June 15. This timing will allow the dispensers to last 90 days until September 15, the last point at which eggs hatch. The later timing will help to protect the fruit. Most orchards will need to apply a cover spray for the first generation (usually mid to late May).

Product labels provide instruction on placement in the orchard, but in general:

- Hang dispensers singly and uniformly throughout the orchard, in the top third of the tree canopy
- Choose sturdy branches for hanging so that dispensers remain attached even in high winds
- Dispensers last just one season; a fresh batch should be reapplied each spring
- Store leftover dispensers in the freezer for up to one year
- For new mating disruption orchards, consider doubling the application rate on the borders and at problematic “hot spots”
- Monitor moth population with pheromone traps and check trees for injury to assess effectiveness

### APPLYING MATING DISRUPTION PRODUCTS

The timing of when to apply the mating disruption dispensers will depend on which brand you choose.

<table>
<thead>
<tr>
<th>Dispenser</th>
<th>Pheromone Load</th>
<th>Minimum Rate per acre</th>
<th>Product Cost/acre</th>
<th>Longevity</th>
<th>Application Timing</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isomate-PTB TT</td>
<td>(E)-5-Decenyl acetate</td>
<td>48.84% (269 mg)</td>
<td>200/acre</td>
<td>$100</td>
<td>150 days</td>
<td>One month before expected biofix Works best when pheromone saturates orchard before moths emerge</td>
</tr>
<tr>
<td>(Pacific Biocontrol)</td>
<td>(E)-Decen-1-ol</td>
<td>2.92%</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Checkmate PTB-XL</td>
<td>8.34% (200 mg)</td>
<td>200/acre</td>
<td>$75-100</td>
<td>90 days</td>
<td>June 15</td>
<td>Apply first generation cover</td>
</tr>
<tr>
<td>(Suterra)</td>
<td>1.73%</td>
<td></td>
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**APPLYING MATING DISRUPTION PRODUCTS**

Orange, large plastic delta traps are recommended for monitoring peach twig borer. Unlike white, the orange color does not attract bees. Lures are available that last either 30 days or 60 days.

**MONITORING**

Monitoring peach twig borer populations using pheromone traps in disrupted orchards is essential to determine pest pressure and the need for supplemental insecticide. There are no specially manufactured pheromone lures for peach twig borer mating disrupted sites. Traps using a standard lure in MD orchards should ideally never trap any moths.

Peach twig borer moths are small (less than 1/4 inch) and a dark, dull gray. The palps at the top of the head give it a pointed appearance. Monitoring traps in successful mating disruption orchards will catch very few moths (0 to 3 moths/week is normal). Trap catches over 10 moths/week may warrant a supplemental insecticide, although this number is just a general recommendation.
• Not applying supplemental insecticides when necessary
• Not monitoring and detecting increased moth populations and shoot strike injury
• Not applying dispensers according to labeled recommendations

CONCLUSION

Mating disruption can be a highly effective method to lower peach twig borer populations and reduce insecticide usage, and is organic approved. It does not kill moths, but prevents or delays mating. It is only appropriate for use in contiguous blocks of 10 acres or more.

Dispensers are applied either one month before predicted biofix (Isomate brand) or around June 15 (Checkmate brand). It is critical to prevent high populations of peach twig borer from building up in a disrupted orchard; otherwise, fruit injury is likely to occur. Transition of orchards from traditional twig borer management to mating disruption is most successful if a complete or nearly-complete spray program is used in combination with mating disruption for the first season or two to lower moth populations. Thorough monitoring of moth populations and use of injury thresholds to determine the need for supplemental treatments are essential for successful implementation of mating disruption.

RESOURCES


