Section 2

Mating Disruption
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Mating disruption, use of pheromones, should be considered a foundation of any apple pest management program. When using hand-applied dispenser products (Fig. 1), it provides season long control of the key pest, codling moth. In our experiences, mating disruption reduces the need for additional insecticide applications for codling moth, reduces crop injury, and, over time, reduces costs of pest control.

The mating disruption products that we believe are the most reliable and for which we have the most experience are the hand-applied dispensers. Full label application rates of these products are 200 to 400 per acre. There are other options for applying pheromones (Table 1), but, in general, their use increases the risk of crop injury or the need to apply more supplemental insecticides.

### Table 1. A summary of the kinds of dispensing systems for pheromones.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Puffers</th>
<th>Meso-dispensers</th>
<th>Hand-applied dispensers</th>
<th>Mini-dispensers</th>
<th>Sprayable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density/acre</td>
<td>1</td>
<td>16-20</td>
<td>400</td>
<td>10,000</td>
<td>A real lot</td>
</tr>
<tr>
<td>Release rate mg/disp./day</td>
<td>200</td>
<td>8-20</td>
<td>0.5-1.0</td>
<td>0.005-0.01</td>
<td>Very low</td>
</tr>
<tr>
<td>Longevity</td>
<td>Season</td>
<td>Season</td>
<td>Season</td>
<td>20-50 days</td>
<td>3-30 days</td>
</tr>
</tbody>
</table>
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How pheromones work
In order to mate, codling moth males must locate females, usually from a significant distance. The female produces a pheromone, a specific chemical that she releases. The male is able to detect extremely small amounts of this pheromone and fly to the source where mating occurs.

How mating disruption works
The hand-applied mating disruption products release the same pheromone as the codling moth female, but they release 10,000 times more. The high amount of pheromone inhibits the ability of the male codling moth to locate and mate with the female.

When to apply mating disruption
Pheromone treatments should be in place prior to the first moth flight.

How many dispensers to apply
The full rate of any dispenser type should be used unless codling moth density is so low growers are already using a reduced supplemental insecticide program. Under a good pheromone-based codling moth control program it is possible to eventually reduce the number of dispensers per acre.

Reducing the number of dispensers per acre increases the risk of crop injury and consequently the need for supplemental insecticide sprays. The graph at the right shows data from a study conducted in 2007. As the number of dispensers per acre were reduced in this study the level of crop damage at harvest increased.

Monitoring mating disruption orchards
Pheromone traps baited with a high load lure (10X) or a combination of pheromone and host-plant kairomones (combo lure) should be used to monitor pheromone treated orchards. Use one trap every 2 to 3 acres. Using fewer traps will increase the chance of false negatives, that is, traps capture no moths but fruit injury occurs. Visual monitoring for fruit injury is also recommended, especially along orchard borders. Visual monitoring can be done quickly and adds confidence to decisions about the need to apply supplemental insecticides.