



Codling moth

Cydia pomonella

Lepidoptera: Tortricidae



Codling Moth: Control in Home Plantings

Fact Sheet No. 5.613

Insect Series | Trees & Shrubs

by W. Cranshaw and R. Hammon*

Codling moth is the most important insect pest of apple and pears in North America. Damage is done by the larvae, which are cream-colored caterpillars that tunnel fruit and produce 'wormy' apples (Figure 1). Control of this insect can be difficult due largely to the feeding habits of the insect, but several measures may be used in home orchards to effectively manage codling moth.

Description of the Insect

The adult codling moth is a small moth, approximately 1/2 inch in length (Figure 2). The general coloration is grayish in appearance with narrow alternating bands of white. The tips of the wings are coppery. Adult codling moths are rarely seen since they are most active during nighttime hours.

The larvae, which are usually found in the fruit, are creamy white to slightly pink. The head and thoracic shield are brown or black. The body will turn from creamy white to a slight pink color.

Although the caterpillars tunnel through the flesh, most feeding is concentrated on the developing seeds of the core (Figure 4). When full-grown they again tunnel out of the fruit, creating larger wounds. Brown excrement is piled around the entry point and where they exit the fruit.

Life History and Habits

Codling moth spends winter as a full-grown caterpillar within a silken cocoon, pupating in late winter or early spring (Figure 5). Adult codling moths first emerge in spring, typically within days of apple bloom. Earlier emergence may occur if the insects spent wintering next to a building or other warm area. Peak emergence can occur within a week of the first moth emergence, but the last moth of the first generation may not emerge for six or seven weeks. Mating occurs within a few days of adult emergence followed by egg laying. Egg laying increases as night time temperatures increase above 62°F.



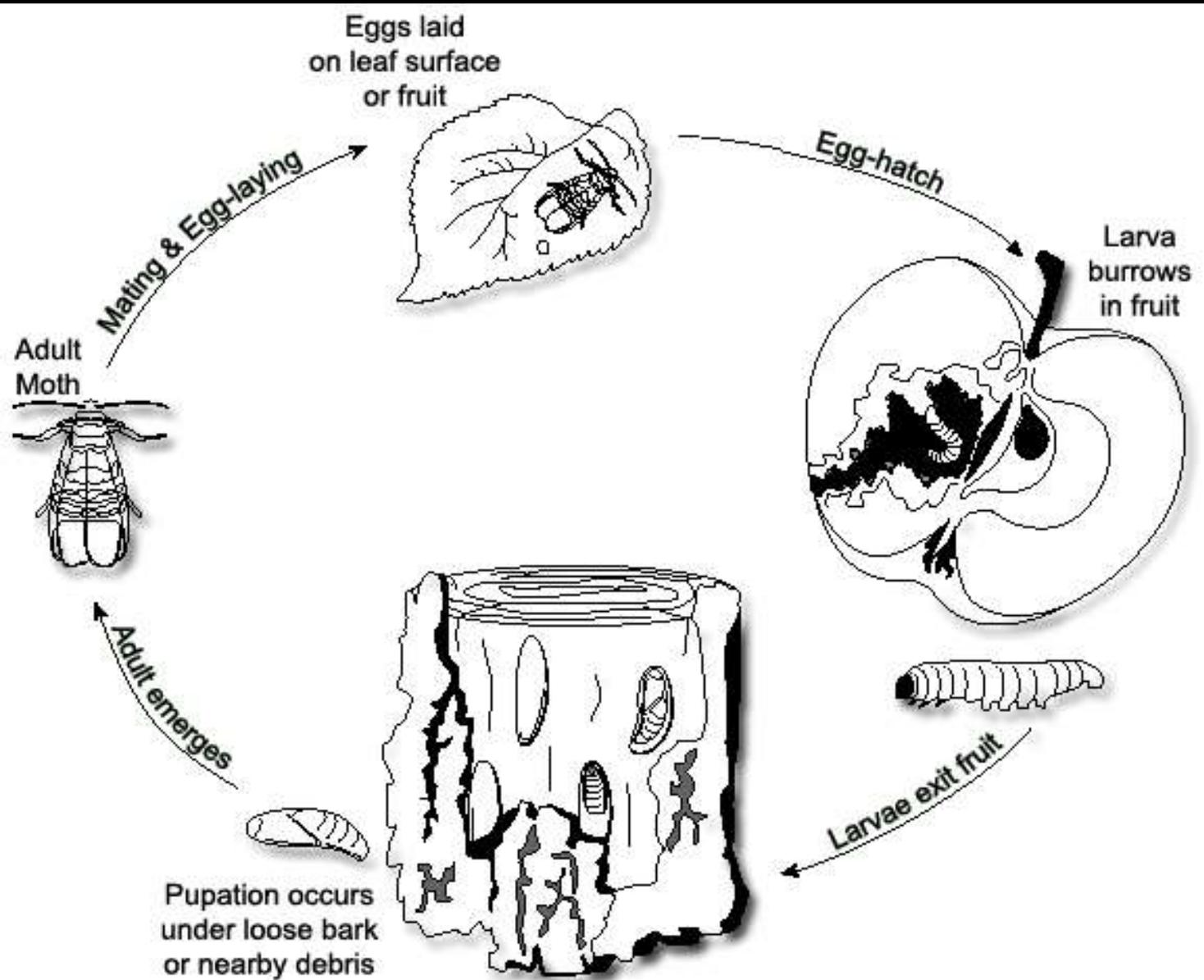
Quick Facts

- The caterpillar of the codling moth is the common 'worm' in a wormy apple or pear.
- Most injury is usually produced by the second generation, which begins in early summer.
- Non-chemical controls that can reduce fruit damage include fruit thinning, prompt removal of infested fruit, bagging of fruit and the use of certain traps.
- Insecticides are useful when applied to coincide with periods when eggs are being laid and before the newly hatched caterpillars borer into fruit.

Codling moth larvae tunnel into fruit to feed on the developing seeds in the core



Generalized life cycle of the codling moth. Two or three generations are produced along the northern Front Range.





During winter the codling is present as a full-grown larva, hidden under loose bark or other protective cover in the near vicinity of host trees



**Overwintering
stage -
Dormant, full-
grown larva**



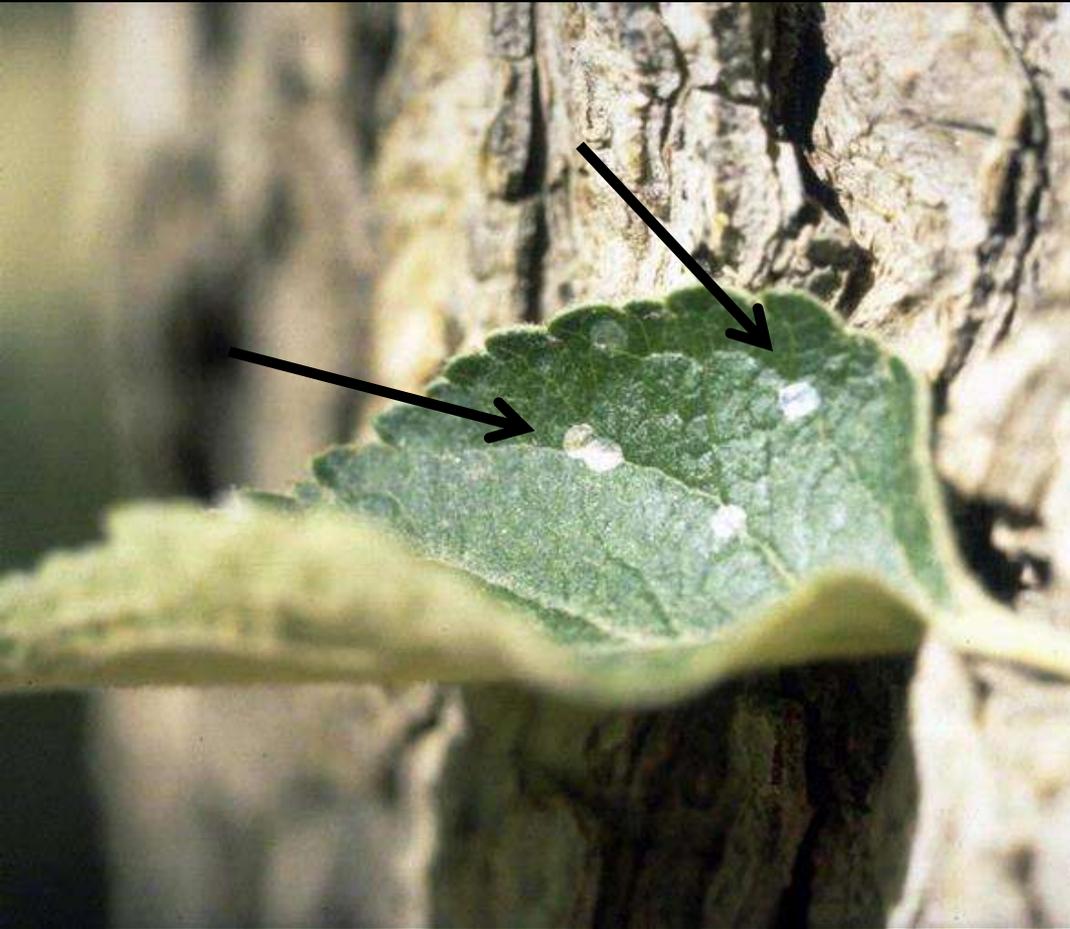
**Transition to pupa
occurs in late winter/
early spring**





After the adults emerge they mate and the female goes through a period during which eggs are maturing. The eggs are then laid on fruit or leaves.







Red ring stage of codling moth egg – develops about mid-way through egg development



Just before egg hatch the dark heads of the larvae can be observed. First egg hatch typically occurs shortly after petal fall.



Larvae bore into fruit. Frass may be noted at entry point.





Common entry points are at the stem or calyx end



**Points of fruit/fruit contact
are common codling moth
entry points**





The larvae tunnel through the flesh and feed primarily in the core



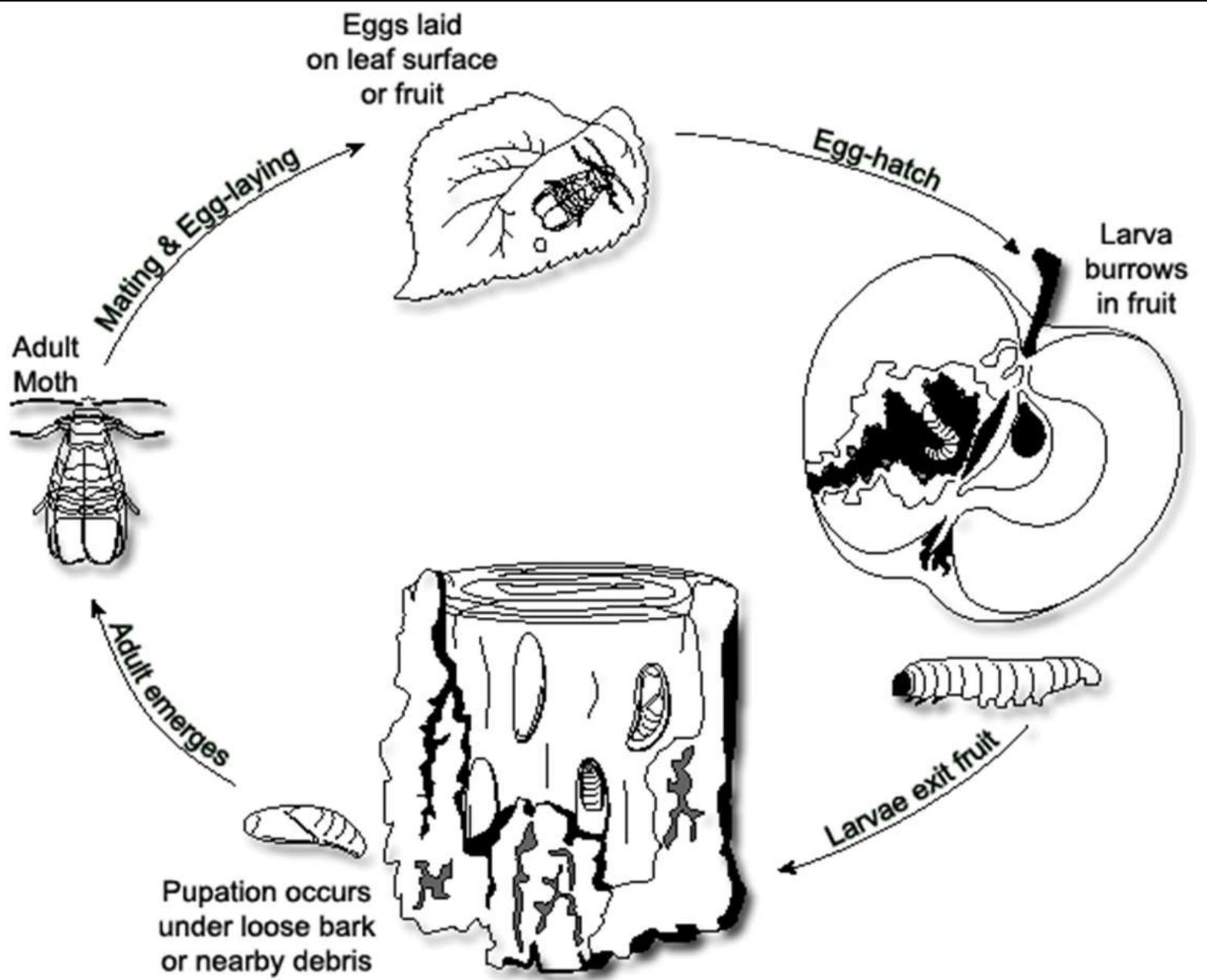


**When full-grown the
codling moth larva
then leaves the fruit**

Larvae leave
fruit to seek
shelter where
they then
pupate



Repeat a second and, sometimes, a third time each season





Optimum timing
window for codling
moth sprays –
**When eggs are
hatching and
before larvae have
entered fruit**

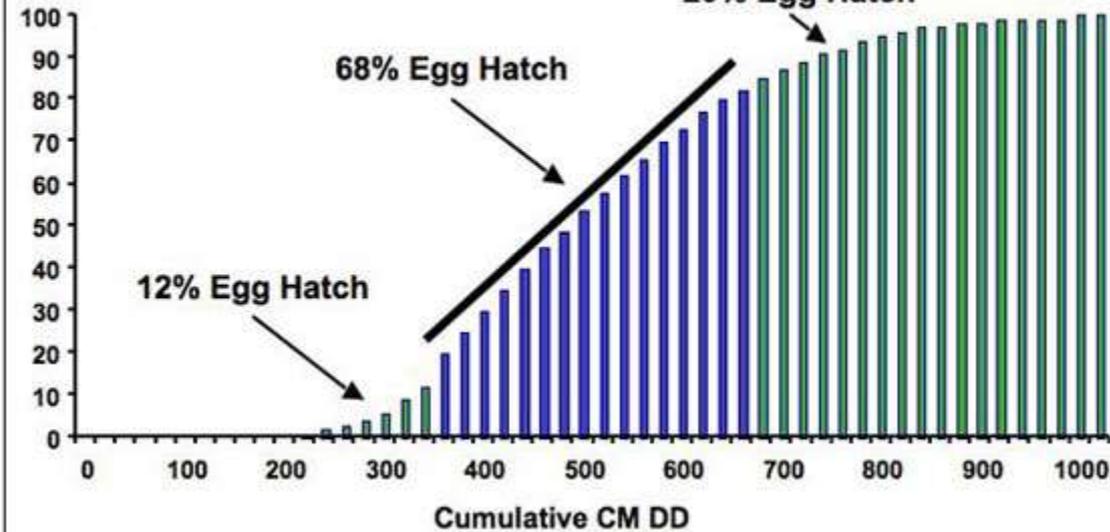


Percent Egg Hatch (1st Generation)

20% Egg Hatch

68% Egg Hatch

12% Egg Hatch



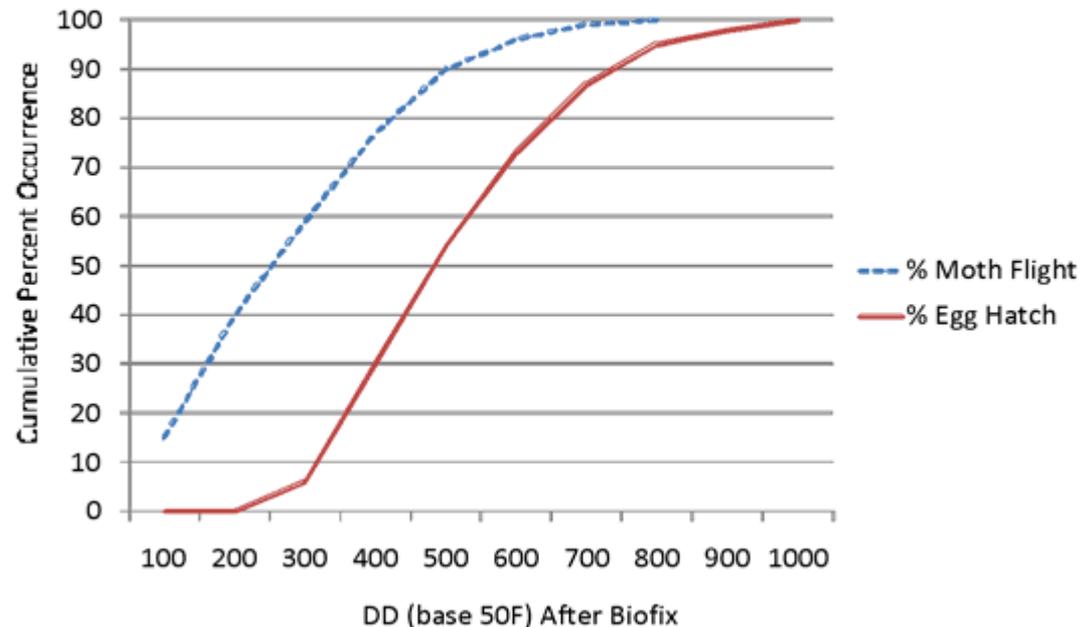
Development of
codling moth is
predictable

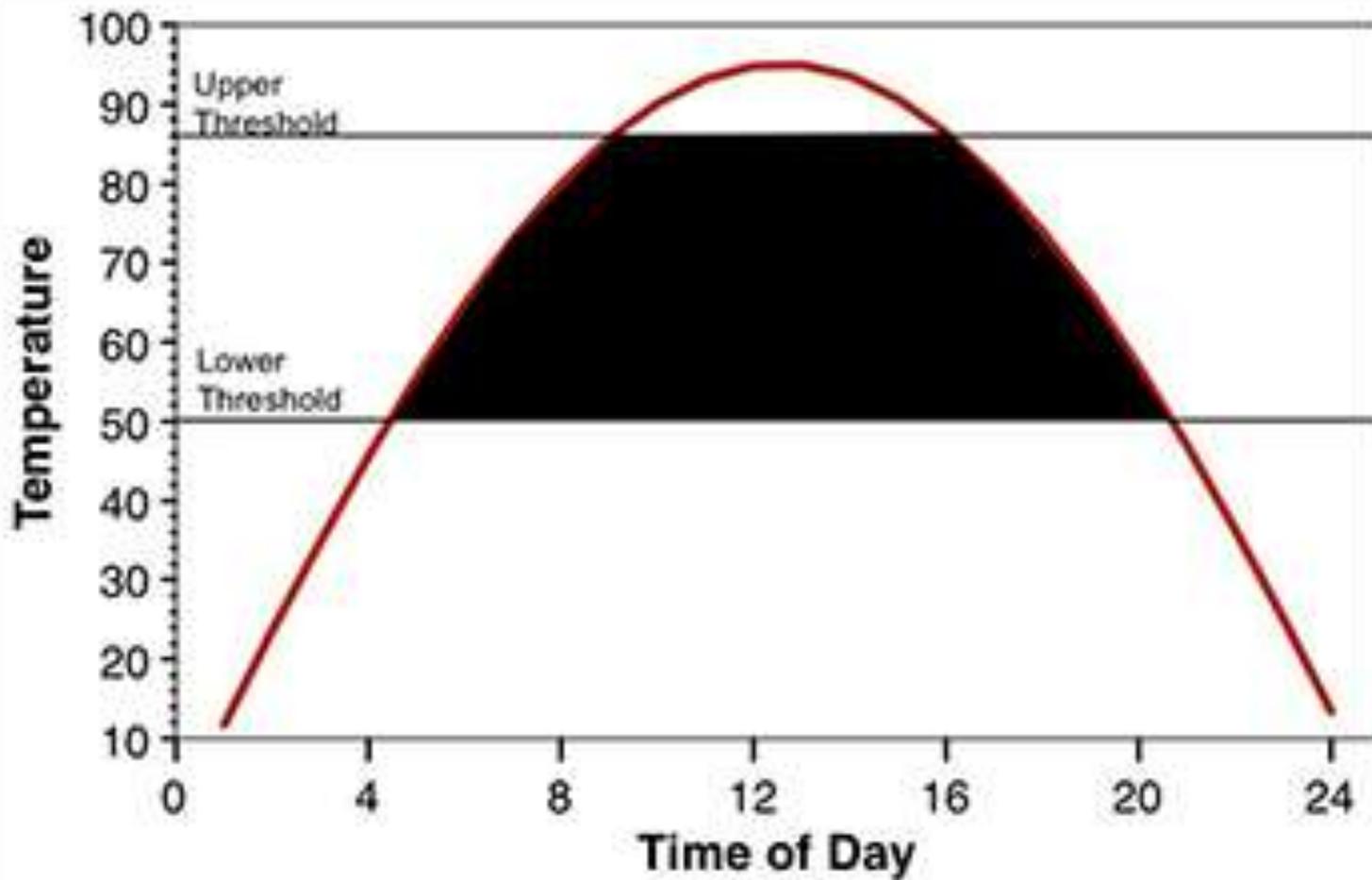
Predictions are modified
by temperature.

Degree day – Day when
average temperature
exceeds by one degree
the lowest threshold for
development

First Generation Codling Moth Phenology

(after Beers et al. 1993)





Base temperature for codling moth (lowest point/threshold at which development can take place) – 50F

Upper threshold (point at which development suspended) – 88F

This is a fact sheet that I think works best for Colorado (better than the CSU sheet). It explains the use of degree day models.



Codling Moth in Utah Orchards

Marion Murray, IPM Project Leader • Diane Alston, Entomologist

Quick Facts

- Codling moth is the major pest of apple and pear, where the larvae tunnel into fruit.
- Codling moths have 2 to 3 generations in Utah, and therefore, fruit is susceptible to attack all season long.
- This pest is monitored by inspecting fruit for damage and with pheromone traps.
- Cultural controls include sanitation, trunk banding, and fruit thinning.
- Biological control is minimally effective because larvae are protected inside fruit.
- Bagging fruit, although labor-intensive, provides complete control.
- For most growers, the main management tactics are insecticides (organic options available) and/or mating disruption (organic).
- Site-specific recommendations are provided by the USU Extension Fruit IPM Advisories (pestadvisories.usu.edu) or from your county USU Extension office.



Figure 1. Codling moth adult shown on a trap sticky liner.

HOSTS

primarily in: apple, pear, crabapple, and English walnut
rarely in: quince, apricot, plum, peach

LIFE HISTORY

Codling moth (*Cydia pomonella*; Order Lepidoptera, Family Tortricidae) is the most serious pest of apple and pear worldwide. In most of Utah, fruit must be



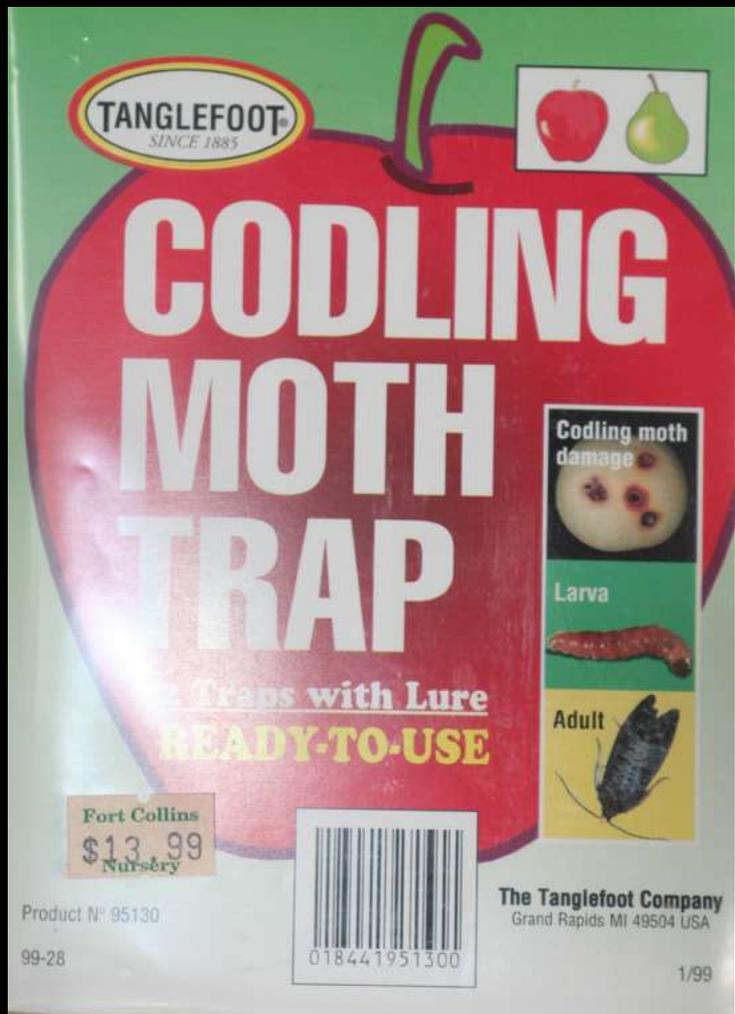
Biofix – Date when sustained captures of codling moths occur in pheromone traps



Delta trap



Pheromone Traps



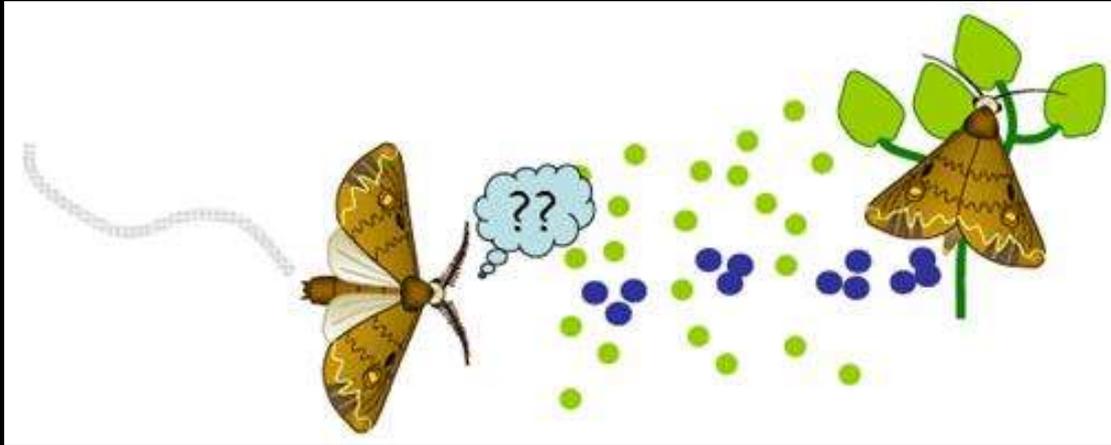
Wing style trap

Pheromones

- **Definition:** A chemical used to communicate between members of the same species

Pheromones

- Definition: A chemical to communicate between members of the same species
- Types of pheromones include:
 - Sex pheromones



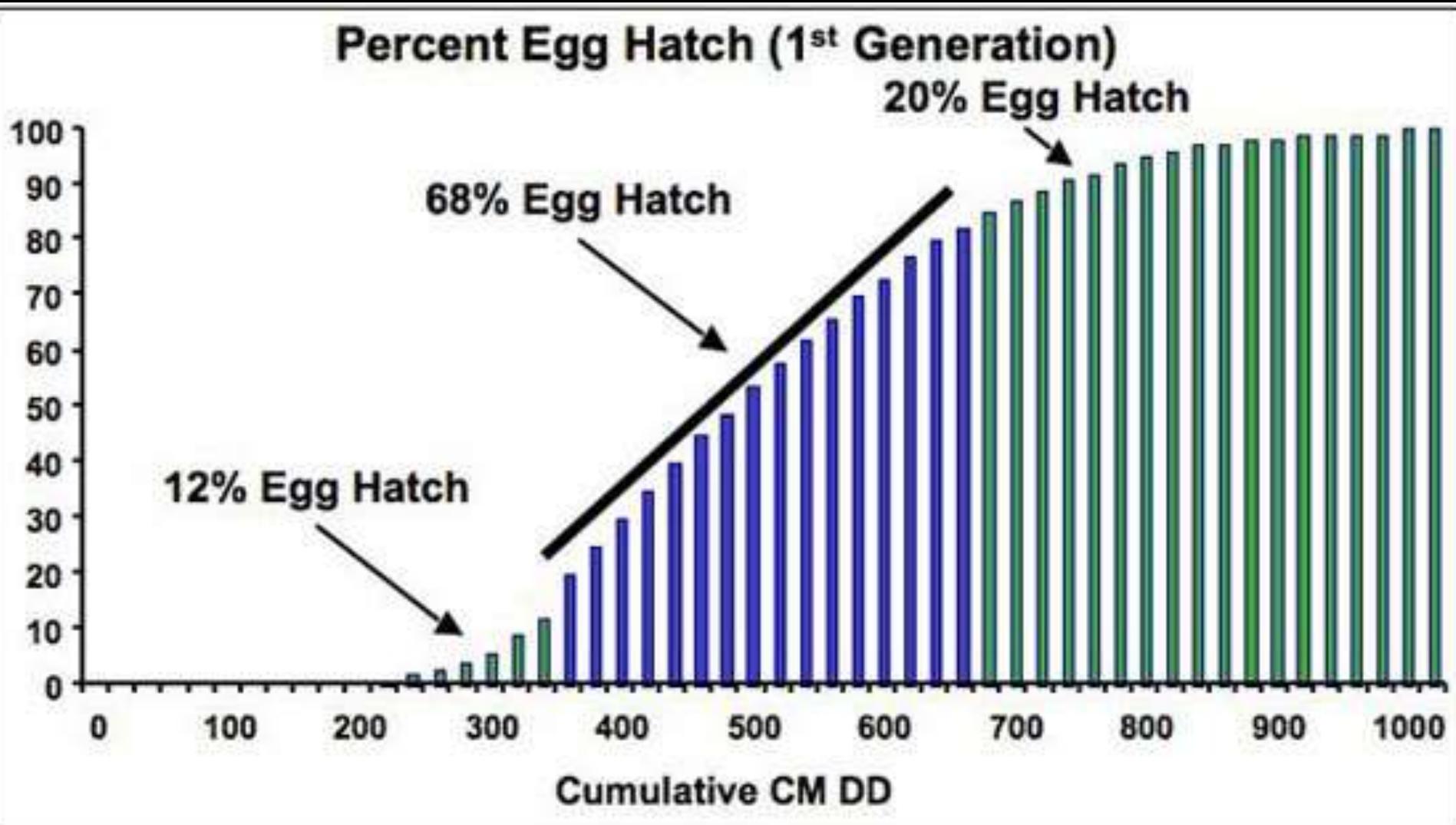


**Male codling moths
captured on sex
pheromone baited trap**



UGA1318055

Most Generation I eggs hatch between 360-660 Degree Days after the Biofix



The Utah publication does list specific products that can be used as sprays to control codling moth. For backyard trees, check the “Residential” column.

Table 2. Insecticide options for commercial and residential sites, listed by Mode of Action (MOA).

MOA	Ingredient	COMMERCIAL	RESIDENTIAL	Efficacy	Notes
Conventional (non-organic) Options					
1	phosmet	Imidan 70 W		3-4	Must be buffered to appropriate pH
1	carbaryl	Sevin 4F		2-3	
1	malathion		Spectracide Malathion; Bonide Malathion	2-3	Short residual (5-7 days); max 2 applications per season
3	esfenvalerate	Asana XL ^R	Monterey Bug Buster II	3-4	
3	fenpropathrin	Danitol 2.4 EC ^R		3	
3	lambda-cyhalothrin	Warrior II ^R	Bonide Fruit Tree & Plant Guard	4	
3	gamma-cyhalothrin		Spectracide Triazicide Insect Killer	3-4	
3	zeta-cypermethrin		GardenTech Sevin; Gordon's Bug-No-More	3-4	
3/4	lambda-cyhalothrin/ thiamethoxam	Endigo ZC ^R		2-3	
3/28	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress ^R		4	
4	acetamiprid	Assail 30 SG		3-4	Use with oil
4 /28	thiamethoxam/ chlorantraniliprole	Voliam Flexi		4	
5	spinetoram	Delegate WG		3-4	

Examples of brands may not be all-inclusive, but are meant to provide examples of effective insecticides registered on apple and pear in Utah.

^RRestricted use products require an applicator license.



Some Cultural Controls for Codling Moth





Fruit Thinning

Thinned fruit is less likely to be successfully attacked by young codling moth larvae

**Cull fruit with
developing larvae**



**Bag high value fruit
to prevent egg
laying by codling
moth**





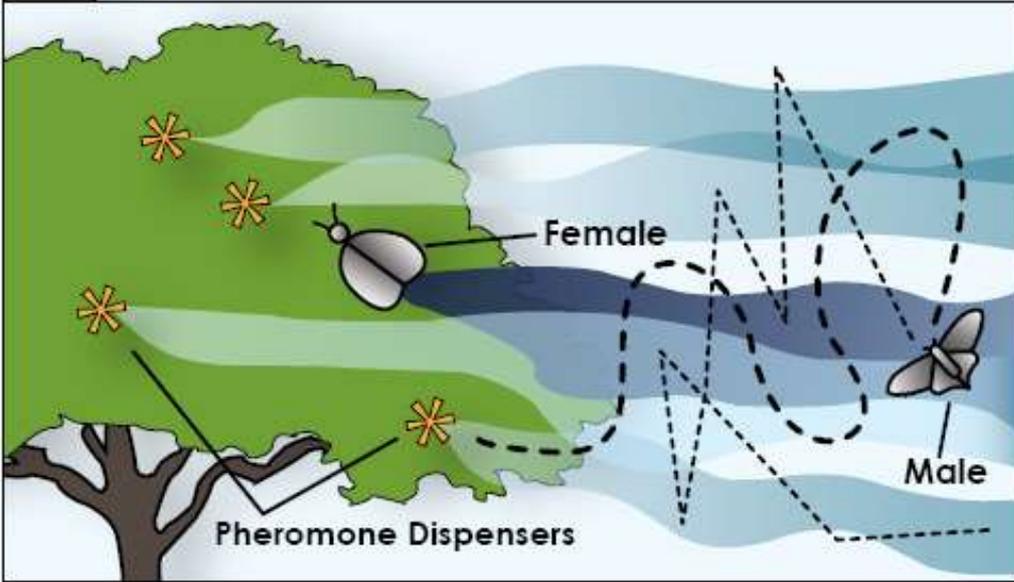
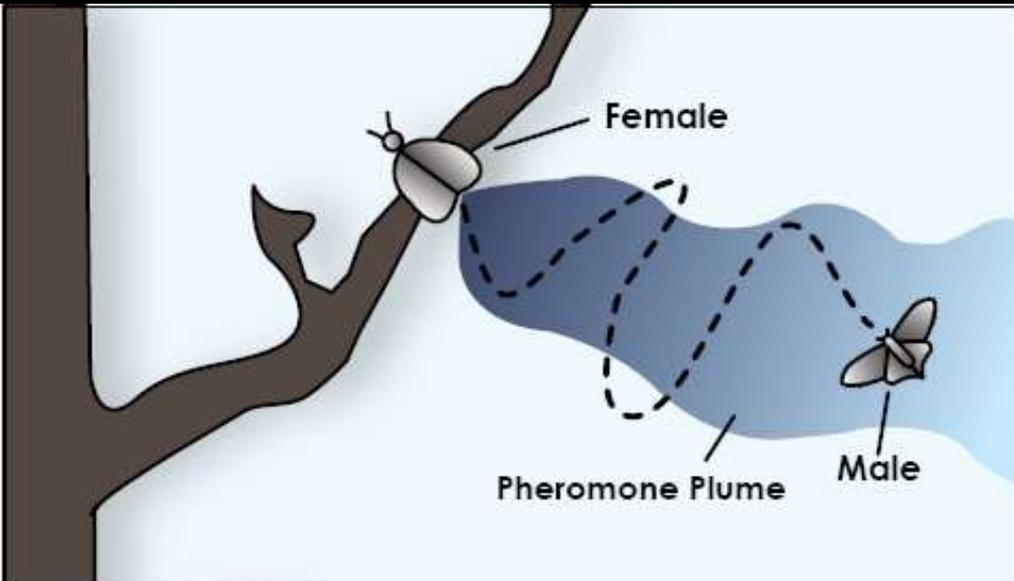
**Trap and destroy
larvae and pupae
in trunk bands**







Mating Disruption with Sex Pheromones



Strategy: Saturate the environment with sex pheromones to prevent males from finding and mating with females.

Non-fertilized females will then lay infertile eggs.



Dispensers used to emit high amounts of codling moth sex pheromone



Mating Disruption for Backyards?





Mating disruption requires large block plantings. Excessive mating occurs outside treated area in small blocks/isolated plants

