Eastern NY IPM Training
Orchard Pests Review: Biology, Monitoring, Management

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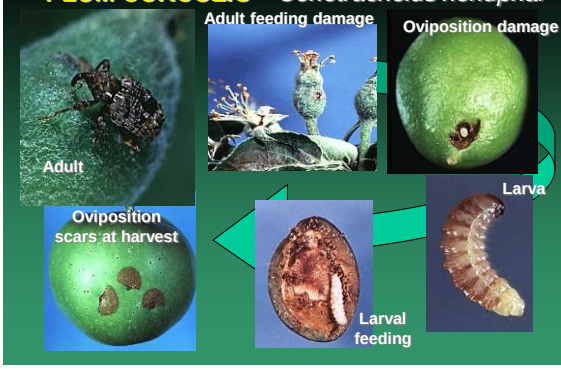
TREE FRUIT SYSTEMS ECOLOGY

Factors contributing to the complexity of host/pest interactions in tree fruit systems:

- Fruit trees are perennial crops; their long-lived nature encourages the development of host/pest interactions.
- Orchards are highly diverse habitats with numerous ecological niches incorporating a variety of secondary host plants, invertebrate and vertebrate species, and therefore a variety of potential pests and natural enemies.
- Tree fruits represent a relatively rich food resource, able to be exploited by many species.
- Abandoned, wild or volunteer pome fruit or stone fruit trees are usually located in proximity to crop trees, in which naturally occurring pest populations are not controlled.

PLUM CURCULIO – *Conotrachelus nenuphar*



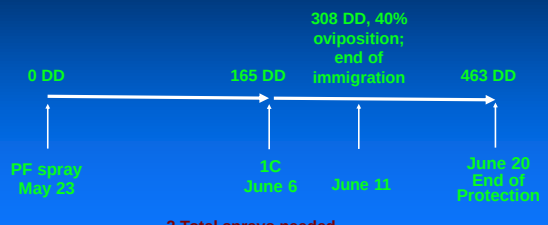
PLUM CURCULIO: MANAGEMENT ASSUMPTIONS

- **Commercial apple orchards in NY do not harbor indigenous infestations of PC adults.**
- **Adults overwinter in ground debris outside of orchard.**
- **PC adults begin to immigrate into the edges of orchards from outside sources in spring before petal fall (55-60° F).**
- **Usually in the trees during bloom.**
- **Annual length of oviposition period depends upon seasonal temperatures after petal fall.**
- **Effective control requires preventive insecticide sprays from petal fall until the end of oviposition period.**

PLUM CURCULIO OVIPOSITION MODEL

- Experimentally derived from modeling cumulative Plum Curculio oviposition and DD accumulation (base temp 50° F) after petal fall.
- Model assumes that fruit requires protection from petal fall until about 40% of the cumulative oviposition is completed (308 DD) – corresponds with the end of their immigration into orchard.
- Depending on spring temperatures, PC control could require either 2 or 3 sprays (Petal Fall plus 1 or 2 more).

EXAMPLE OF PLUM CURCULIO MODEL PREDICTIONS IN GENEVA FOR THE 2005 SEASON



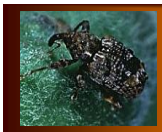
2 Total sprays needed

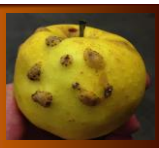
EXAMPLE OF PLUM CURCULIO MODEL PREDICTIONS IN GENEVA FOR THE 2006 SEASON

3 Total sprays needed

Plum Curculio

Recommended Approach





Petal Fall

Activity: Note date of Petal Fall in McIntosh apple variety

then:

Use Petal Fall date + NEWA Apple Insect Model to determine the end of PC immigration into orchards (corresponding to the end of fruit protection period). Maintain pesticide coverage until this date has passed.

Suggested Action Threshold: 308 DD (base 50° F) from petal fall in Macs.

Tortricids:
Most Important Internal Fruit Feeding Lepidoptera

Codling moth, *Cydia pomonella*

Oriental fruit moth, *Grapholita molesta*

Lesser appleworm, *Grapholita prunivora*

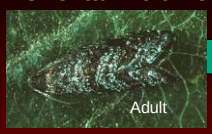
Fruit Injuries by Various Internal Lepidoptera Larvae

Codling moth

Oriental fruit moth

Lesser appleworm

Oriental Fruit Moth, *Grapholita molesta*

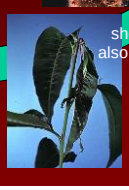


Adult

Egg

Larval tunnelling and "flagged shoot" (can also occur on apple)

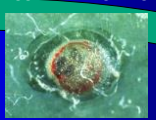
Internal fruit damage



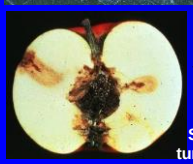
Codling Moth, *Cydia pomonella*

Adult

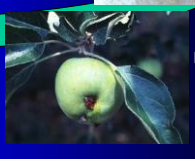
Egg, "red ring stage"



Larva

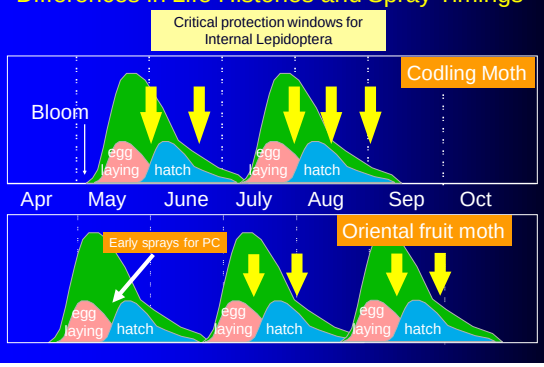


Severe tunnelling



External feeding damage

Differences in Life Histories and Spray Timings



Oriental Fruit Moth

Recommended Approach

Late Pink to Bloom
Activity: Monitor for 1st adult flight (pheromone traps); n
Pheromone mating disruption:
Isomate OFM TT / Isomate CM/OFM TT / Checkmate CM-OFM Duel

Petal Fall
Activity: Use biofix + NEWA Apple Insect Model to time sprays for 1st larval generation
Suggested Action Threshold: 350-375 DD (base 45˚ F) from biofix

Summer (July, August):
Activity: Use biofix + NEWA Apple Insect Model to time sprays for 2nd larval generation
Suggested Action Threshold: 10% hatch point estimated at 175-200 DD (base 45˚ F) from first sustained adult catches of the 2nd and 3rd broods; follow-up applications at 10–14-d interval

Codling Moth

Recommended Approach

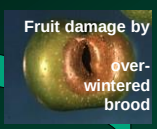
Bloom
Activity: Monitor for 1st adult flight (pheromone traps); note biofix
Pheromone mating disruption: Isomate CM/OFM TT / Checkmate CM-OFM Duel (Additionally, in High-risk blocks: Cydex/Madex CM Virus)

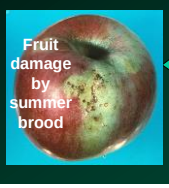
June
Activity: Use biofix + NEWA Apple Insect Model to time sprays for 1st larval generation
Suggested Action Threshold: For larvicidal products, 250-360 DD (base 50˚ F) from biofix; 150 DD for ovicides

Summer (mid-late July):
Activity: Use biofix + NEWA Apple Insect Model to time sprays for 2nd larval generation
Suggested Action Threshold: For larvicidal products, 250-360 DD (base 50˚ F) from first sustained adult catch of the 2nd brood; 150 DD for ovicides

OBLIQUEBANDED LEAFROLLER

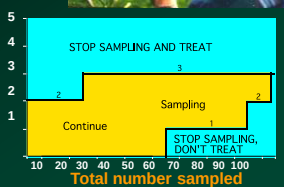
Choristoneura rosaceana



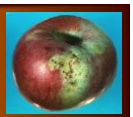


OBLIQUEBANDED LEAFROLLER

Sampling for a Treatment Decision



Obliquebanded Leafroller



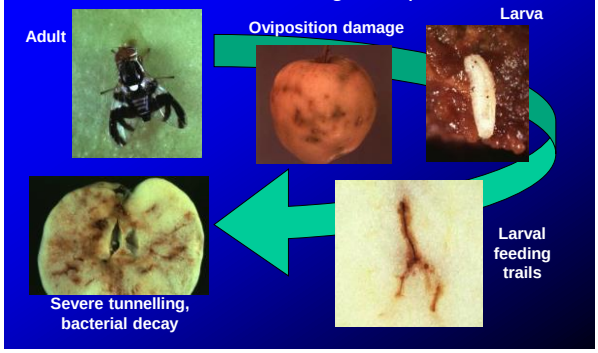
Recommended Approach

Late Bloom
Activity: Use Obliquebanded Leafroller Sampling Form to examine bud clusters for 3% infestation threshold of OBLR larvae (Ref: TF Guidelines Insect & Mite Mgt Chapter)
Suggested Action Threshold: 3% of clusters infested

June 1
Activity: Monitor for 1st adult flight (pheromone traps); Use biofix + NEWA Apple Insect Model to time sprays for 1st larval generation
Suggested Action Threshold: High-risk blocks: 360 DD (base 43˚ F) from biofix

OR
Suggested Action Threshold: Low-risk blocks: 600 DD (base 43˚ F) from biofix – Use Obliquebanded Leafroller Sampling Form to examine expanding terminals for 3% infestation threshold of OBLR larvae

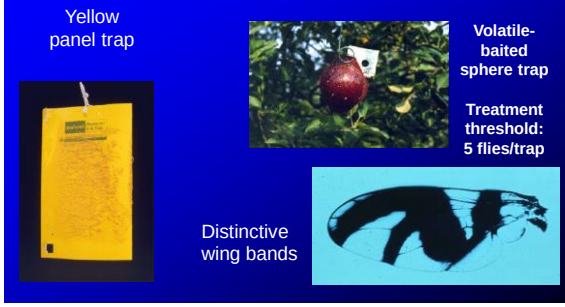
APPLE MAGGOT - *Rhagoletis pomonella*



Principles of Apple Maggot Management

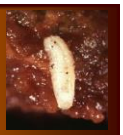
- Commercial apple orchards in New York State have no internal infestations of AM.
- AM management programs are designed to control flies immigrating into orchards from outside sources.
- Preventive insecticide sprays are effective in controlling AM.
- Not all orchards need protective sprays; many that do, don't need them for the entire AM flight period.
- Recommended treatment threshold is 5 flies/trap; below this number, captures can be ignored.
- Implementing this strategy can cut the avg number of sprays applied by 50%.

APPLE MAGGOT - Monitoring for a Treatment Decision



Apple Maggot

Recommended Approach



July 1

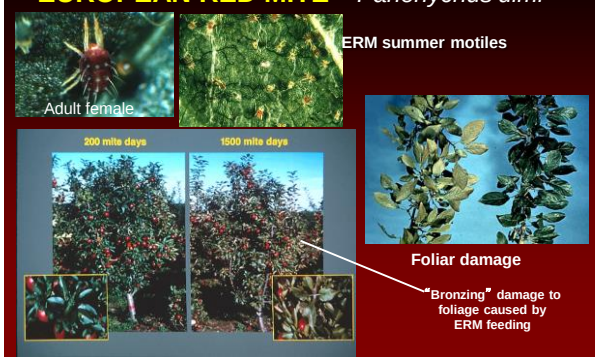
Activity: Place 2-3 volatile-baited AM sphere traps along edge of apple orchard adjacent to hedgerows or source of immigrating adults. Check traps at least twice per week.

Suggested Action Threshold: Average capture of 5 AM adults per trap.

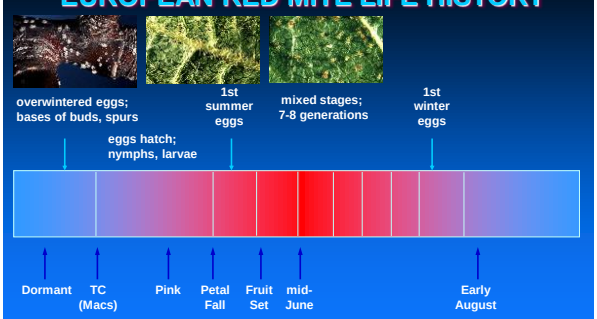
Select appropriate product to apply during adult oviposition period. Repeat if threshold is reached again after period of spray residual efficacy has lapsed (10-14 days)

Continue checking traps using same procedure to protect fruit through August; protection generally not needed beyond this point

EUROPEAN RED MITE – *Panonychus ulmi*



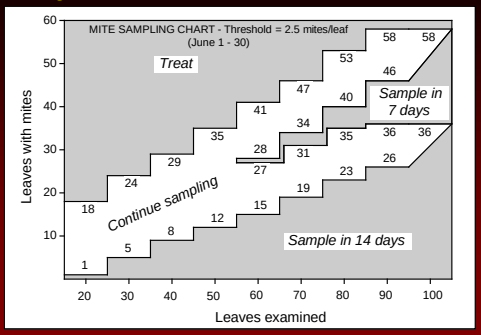
EUROPEAN RED MITE LIFE HISTORY



Some Guiding Principles of Mite Management

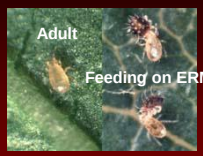
- Can be considered a 2-phase process:
  - Early season program, against overwintering generation
  - Summer program, against new populations
- Usually, a preventive approach (i.e., without need to sample) is advised for early season, depending on previous year's pressure:
  - delayed dormant oil, an ovicide-larvacide (Apollo/Savey/Onager/Zeal) applied prebloom or (with addition of Agri-Mek) after petal fall.
- For summer populations, scouting/sampling advised to pick up rapid mite increases on new foliage, especially during early summer when trees are most susceptible.
  - Thresholds increase as the summer goes on:
    June: 2.5 ERM/leaf; July: 5.0 ERM/leaf; Aug: 7.5 ERM/leaf
  - When numbers of motiles (everything but eggs) reach or approach threshold, a "rescue" material can be recommended:
    Acramite, Apollo, Envidor, Kanemite, Nexter, Onager, Portal, Savey, Zeal

SEQUENTIAL SAMPLING CHART FOR MITES



BIOLOGICAL CONTROL OF EUROPEAN RED MITE

Typhlodromus pyri



Transfer of infested clusters to target tree

Paper band to trap overwintering *T. pyri*

Hibernating *T. pyri*

European Red Mite

Recommended Approach

Delayed Dormant
Activity: Be familiar with past history of ERM. Examine spurs for overwintered eggs.
Suggested Action Threshold: 10% spurs with eggs.
Treatment Options:
Oil Half-inch green – 2%; Tight cluster – 1% OR
Apollo / Savey / Zeal – Tight cluster, Pink OR
Apollo / Savey / Zeal / Agri-Mek – Petal fall

Summer: From mid-June to mid-August, leaves sampled for motiles. Use date-appropriate sampling form to determine whether motiles are over threshold (2.5 / 5.0 / 7.5 per leaf).
[Monitor for presence of predatory mite populations. 1 predator/10 leaves > potential for effective biological control]

Treatment Options:
Kanemite / Nexter / Portal / Acramite / Envidor – Summer months