

Tree Fruit Insect Update

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Optimizing Insecticide Use

- Choosing the correct pesticide at the correct time.
- Using pesticides in a manner to delay or avoid insecticide resistance development.
- Avoid uses that trigger pest outbreaks
 - Harmful to key beneficial arthropods
 - Hormesis or hormoligosis effects
- Avoid harmful environmental impacts
 - Water resources
 - Non-target organisms

Major Direct Pests of Pome & Stone Fruit

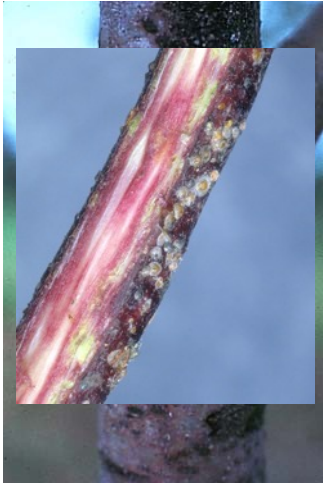
Apple

- San Jose scale
- Plant bugs
- Plum Curculio
- Oriental Fruit Moth
- Stink bugs
- Codling Moth
- Leafrollers
- Apple Maggot

Peaches

- San Jose, White Peach Scale
- Plant bugs
- Plum Curculio
- Oriental fruit moth
- Stink bugs
- Japanese & June beetles
- Peachtree borer

San Jose Scale



Overwinter as immatures on twigs and bark (male oblong).



Winged males emerge and mate with females in early to mid April. Females give birth to live “crawlers.” Females never leave their waxy covering.

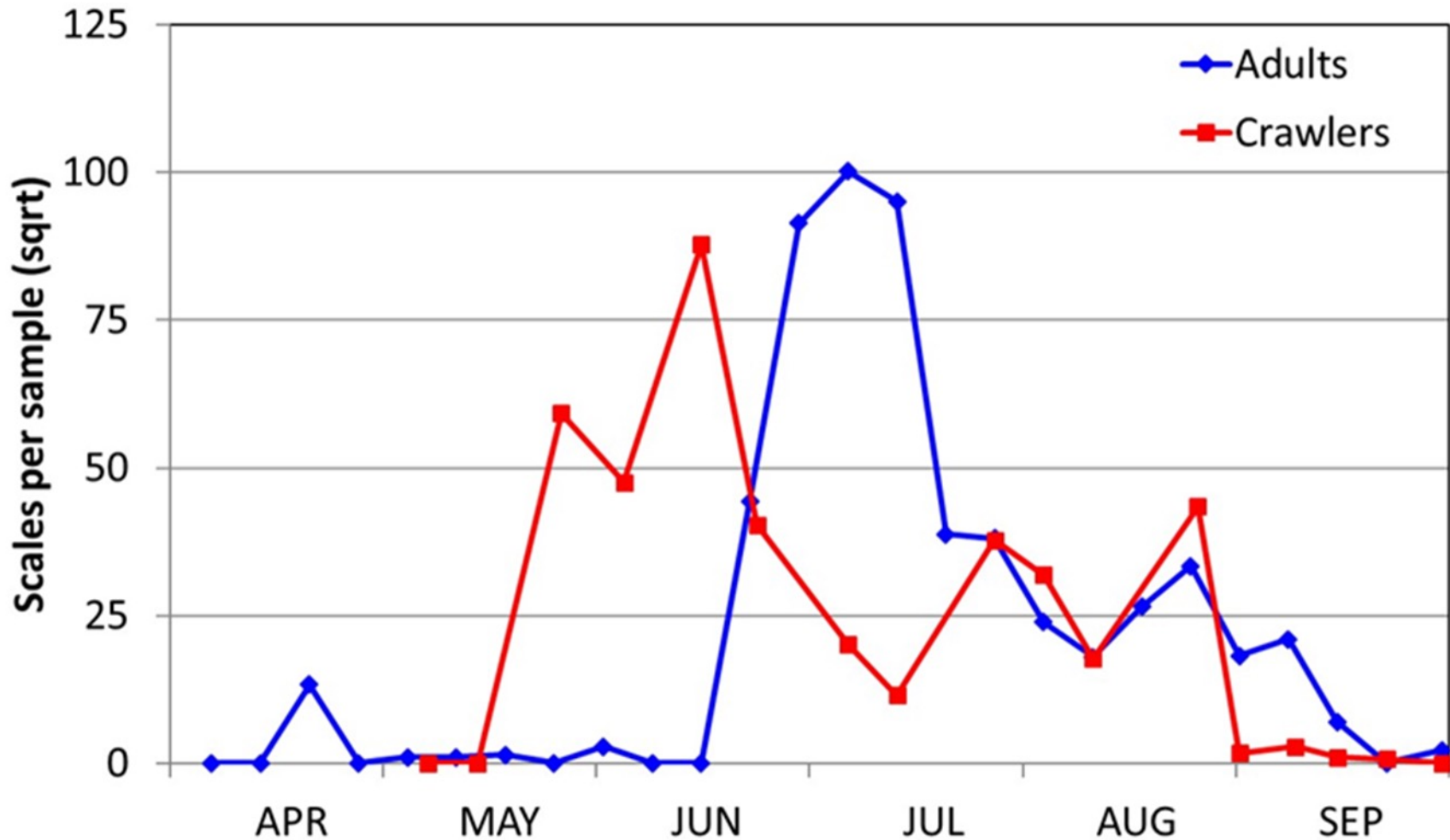


When scales feed on fruit, a reddish spot surrounds the feeding site

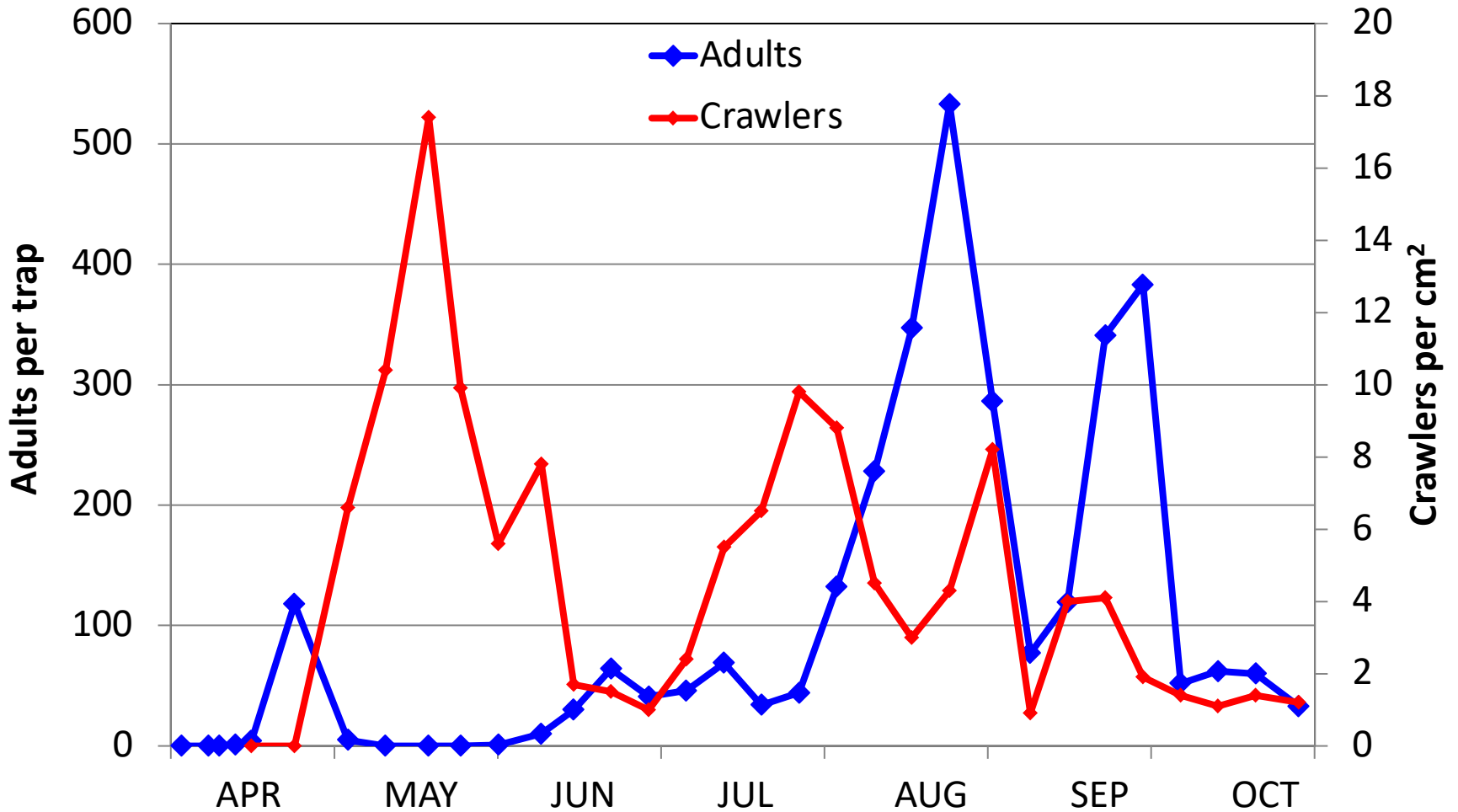


First generation crawlers appear in May. They quickly settle, begin to feed and secrete a waxy scale covering.

Phenology of San Jose Scale in the Henderson County



Phenology of San Jose Scale in Monroe County



San Jose Scale Management Options

- Pre-bloom (target = overwintering scales on twigs)
 - Oil 2% solution
 - +/- Esteem 35WP (4-5 oz)
 - +/- Diazinon 50WP (1 lb/acre)
 - Centaur 50WP (1 lb/acre – do not apply with oil)
- Post-bloom (target crawlers)
 - Esteem 35WP (4 to 5 oz/acre)
 - Centaur WDG (34.5 oz/acre)
 - Diazinon 50WP (2 lb/acre)
 - Assail 30SG (5.3-8 oz/acre) – Reserve for rescue sprays

Petal Fall through Shuck-Split and First Cover

- Catfacing Insects
- Plum Curculio
- Oriental Fruit Moth

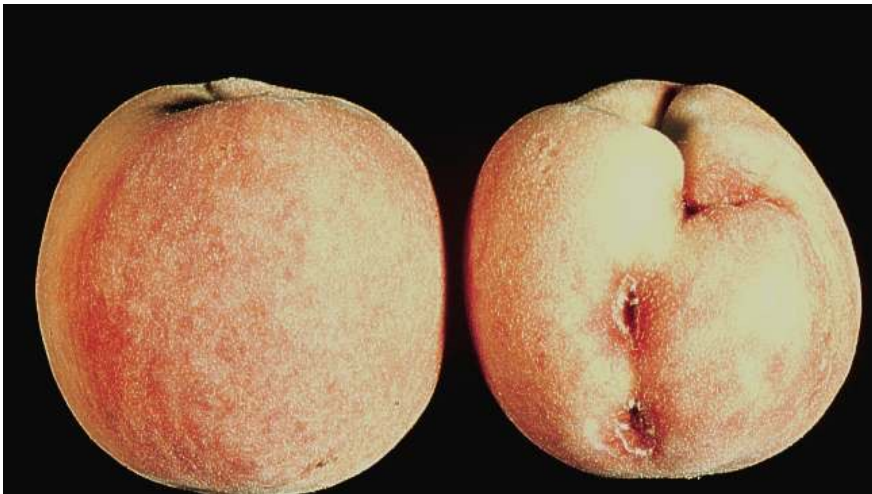
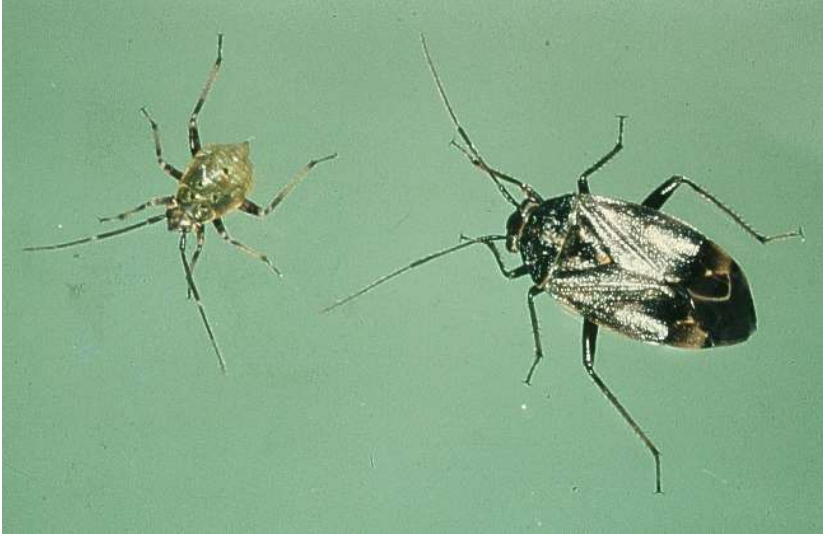


Plant bugs enter orchards in the early spring shortly before bloom. They are attracted to flowers of broadleaf weeds.

Maintaining a clean ground cover is the most effective control strategy.



Catfacing Insects



Catfacing Insects Management

- Movement into Orchard
 - Attracted to flowering weeds
 - Vetch, clover, henbit, chickweed, pepperweed
- Ground cover management
 - Maintain clean ground cover
 - Nimblewill
- Insecticides
 - Petal fall + 1st cover often target plant bugs, but need is debatable

Plum Curculio



Plum curculio adults overwinter in wooded areas on the periphery of orchards. Emergence into orchards occurs in the early spring (bloom – 1st cover)



An insecticide applied at petal fall is usually necessary to minimize damage. Most larvae do not survive in apples.

Plum Curculio



Petal Fall on Apple

Plum Curculio



Oriental Fruit Moth



Petal Fall – 1st Cover on Peach



Plant bugs



**Plum
Curculio**

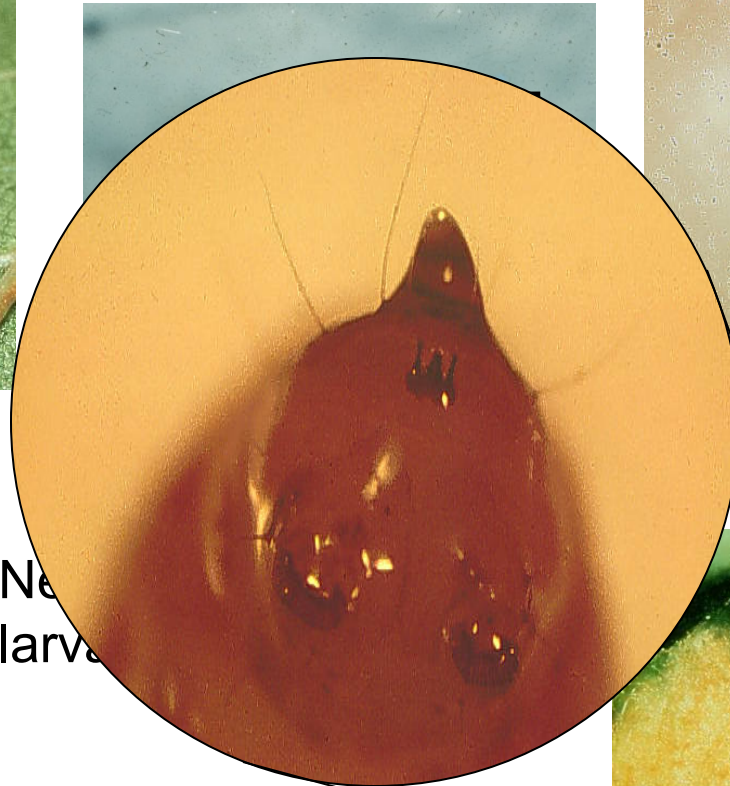


Internal-Feeding Lepidopterous Pests

Codling Moth

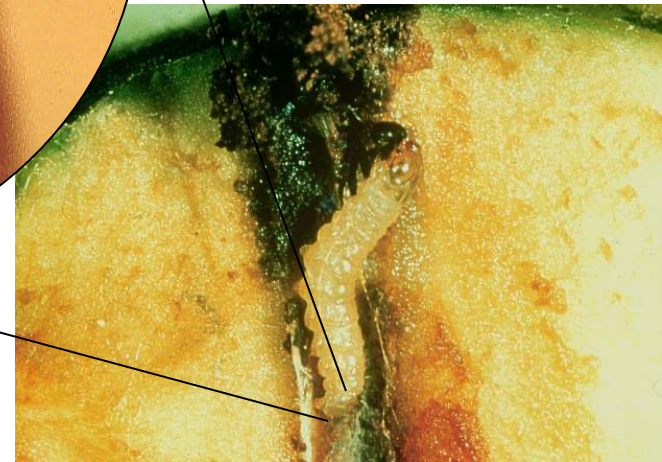


Oriental Fruit Moth



New
larva

Mature larva



OFM Flagging

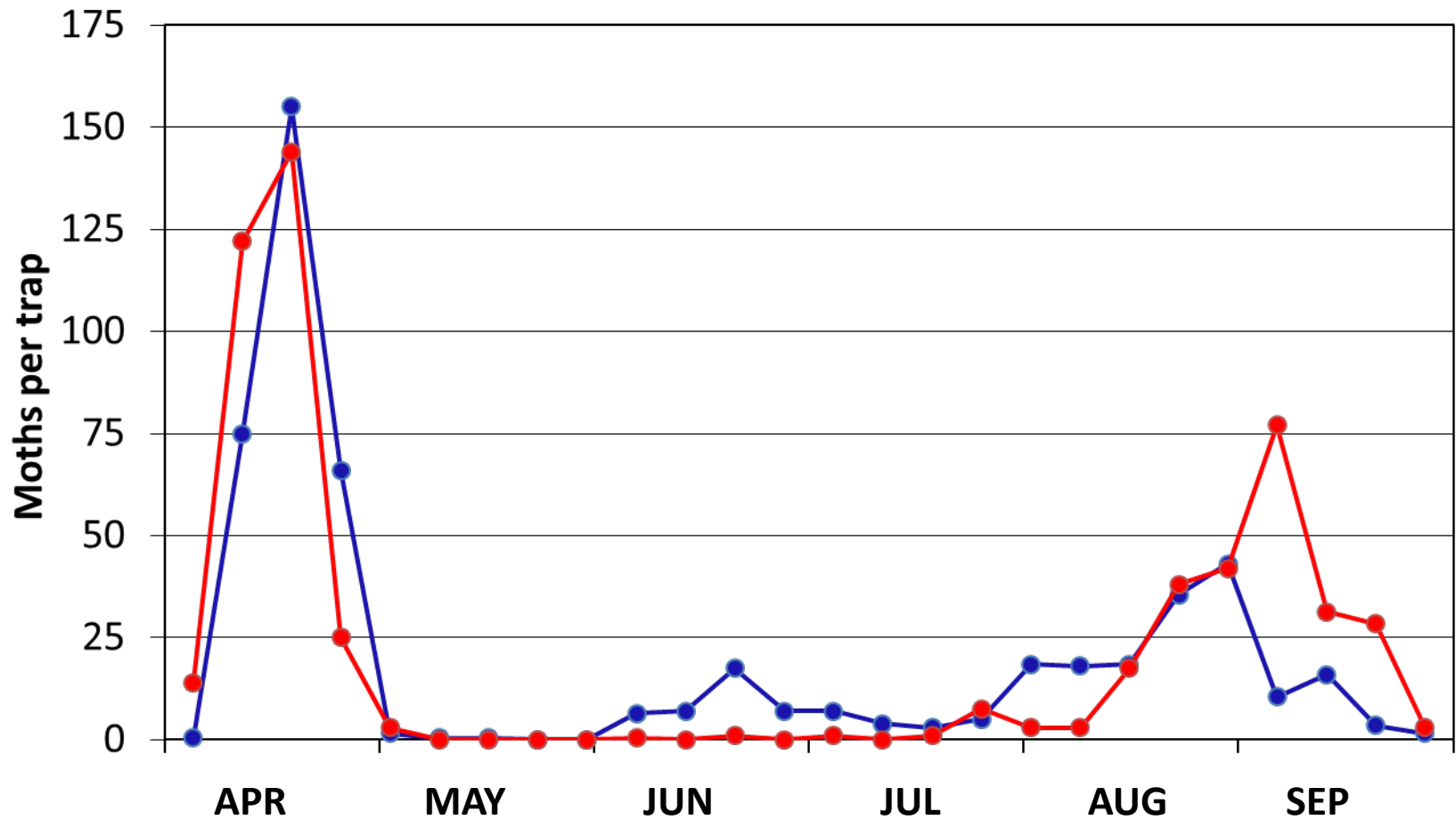




Courtesy Shawn Steffan
State University Extension



Oriental Fruit Moth Pheromone Trap Captures



Petal Fall to 1st Cover

Insecticide	Plant bug	Plum Curculio	Oriental Fruit Moth	Rosy Aphid	San Jose Scale
Actara	E	E	—	E	—
Assail	G	G	G	E	E
Avaunt	—	G	G	—	—
*Imidan	G	E	E	—	—
Verdepryn	—	G	E	—	F
Pyrethroids	E	E	E	G	—
Voliam Flexi*	E	E	E	E	—
Esteem	—	—	F	—	E
Centaur	—	—	—	—	E
Movento	—	—	—	E	E
Diazinon	—	—	F	E	E

*Voliam Flexi: premix of thiamethoxam (Actara) and chlorantraniliprole (Altacor).

Codling Moth on Apple



1ST – 3rd Cover for Codling Moth on Apple

Insecticide	MOA Group	San Jose Scale	Codling Moth
Assail	3A	E	G
Delegate	5	—	E
Altacor, Exirel	28	—	E
Verdepryn	28	F	E
Imidan	1B	—	G
Intrepid	18	—	G
Esteem	7C	E	F
Centaur	16	E	—
Movento	23	E	—
Diazinon	1B	E	—

Pheromone-Based Monitoring

- Species specific and pheromones inexpensive
- Sex and aggregation pheromones most commonly used for monitoring pest populations.
- Improve pesticide use strategies
 - Time treatments
 - Action thresholds
- Use in modeling
 - Establish biofix, validate model outputs
- Surveillance programs (invasive species)

Trap in Upper Canopy



Lure Type

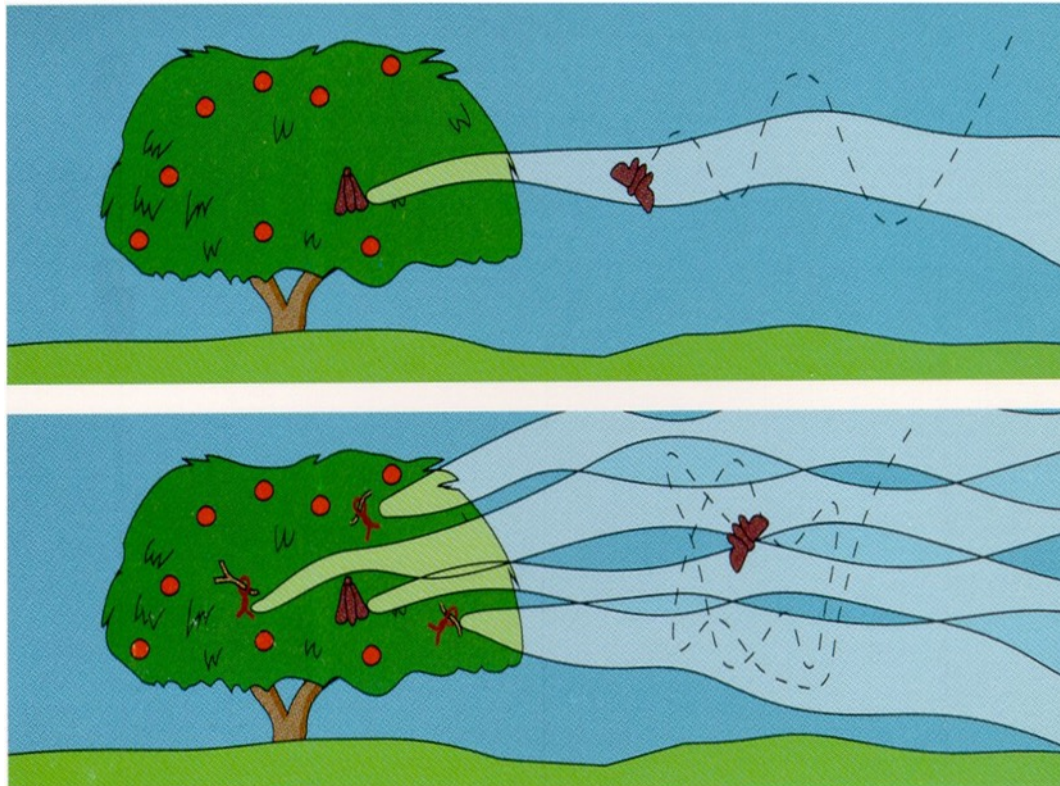


A clean Trap is an Effective Trap



Mating Disruption

- Release of large amounts of sex pheromone into an orchard to disrupt the normal in-flight process of mate location.



Mating Disruption of Codling Moth &/or OFM

Hand applied dispensers



Puffers or Misters



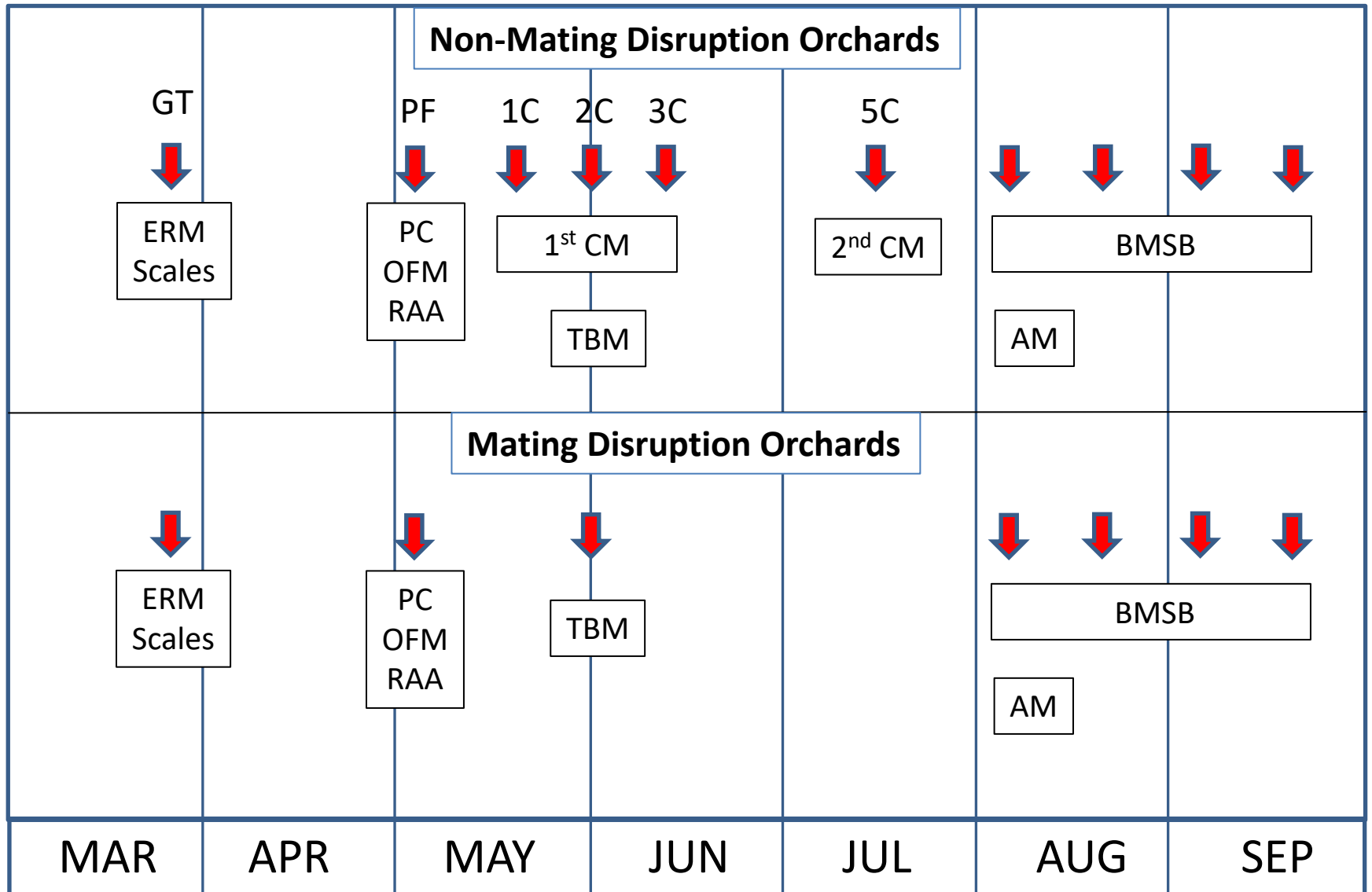
Sprayable Pheromone



Benefits of Mating Disruption

- Resistance Management Tool
 - Once codling moth populations are reduced to low densities, mating disruption can maintain populations at low levels without insecticides.
 - If insecticides targeting codling moth are not reduced, the value of MD as a resistance management tool is negated
- Enhances potential for biological control of secondary pests

Approximate Targeting of Insecticide Sprays on Apples



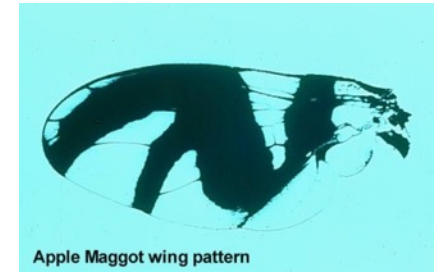
Apple Maggot



Overwinter as pupae in soil



Adults emerge from mid July thru early August



Characteristic wing pattern

Apple maggot trap



Maggot tunneling within fruit



Flies oviposit into fruit



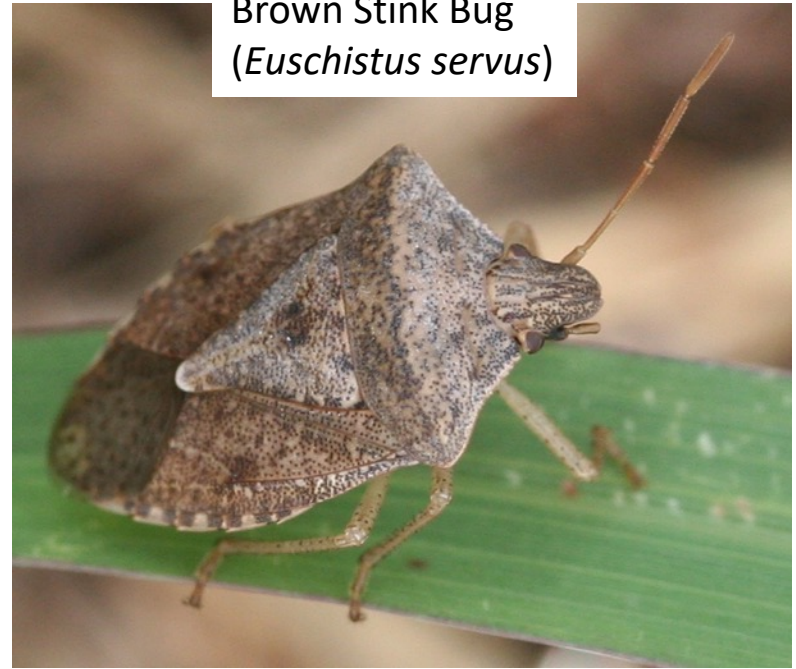
Apple Maggot Trapping



Green Stink Bug
(*Acrosternum hilare*)
(*Chinavia hilaris*)



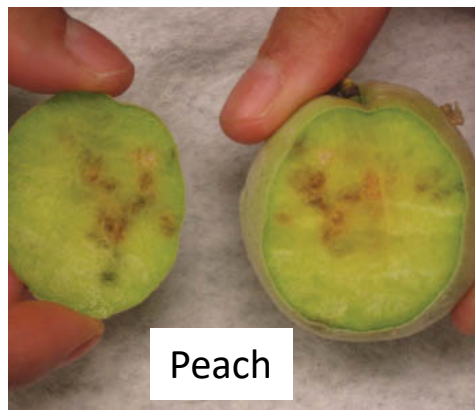
Brown Stink Bug
(*Euschistus servus*)



Brown Marmorated Stink Bug
(*Halymorpha haly*)

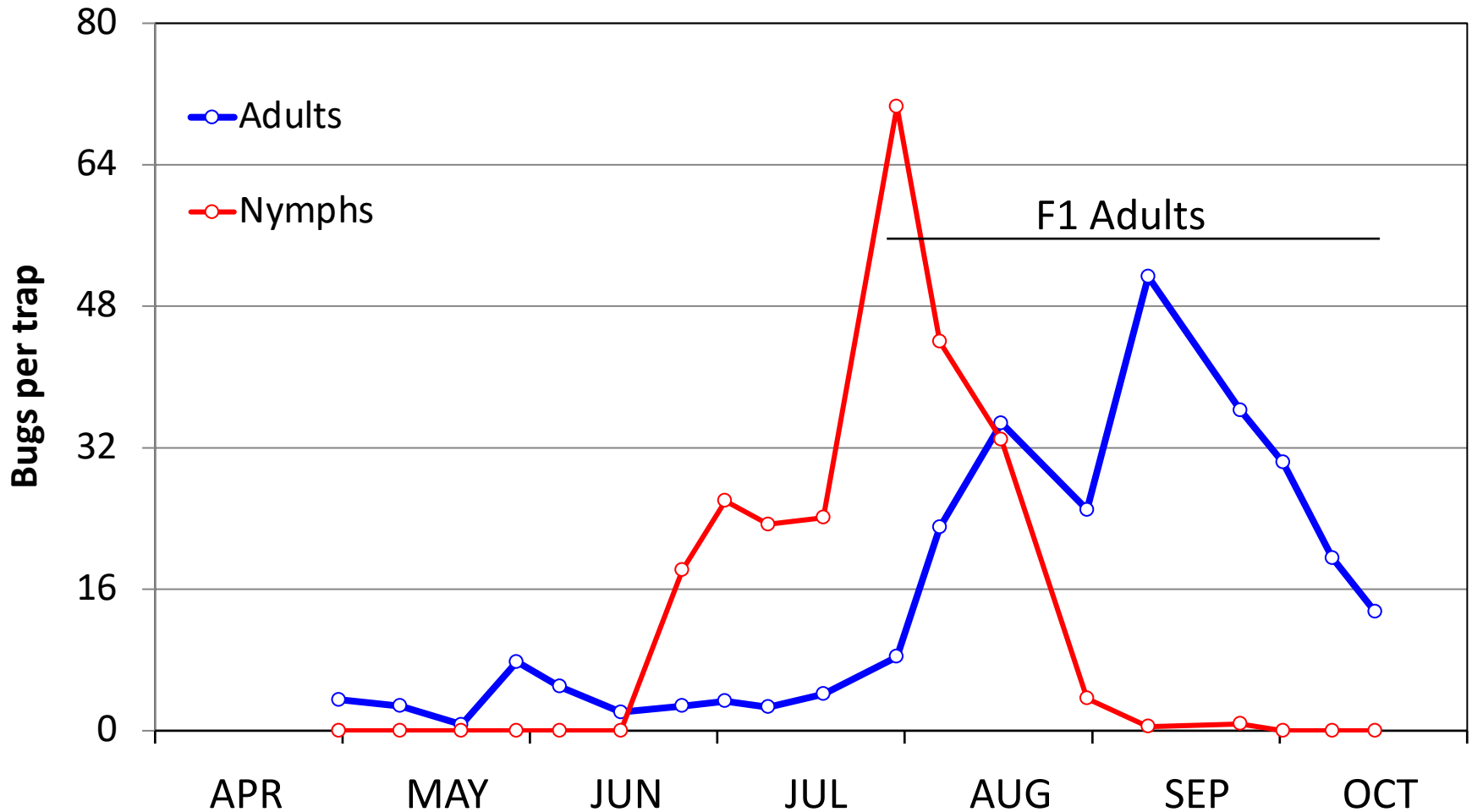


2015 – Beginning of Key Pest Status of Brown Marmorated Stink Bug



BMSB Phenology in WNC

(Captures in Pheromone Traps)

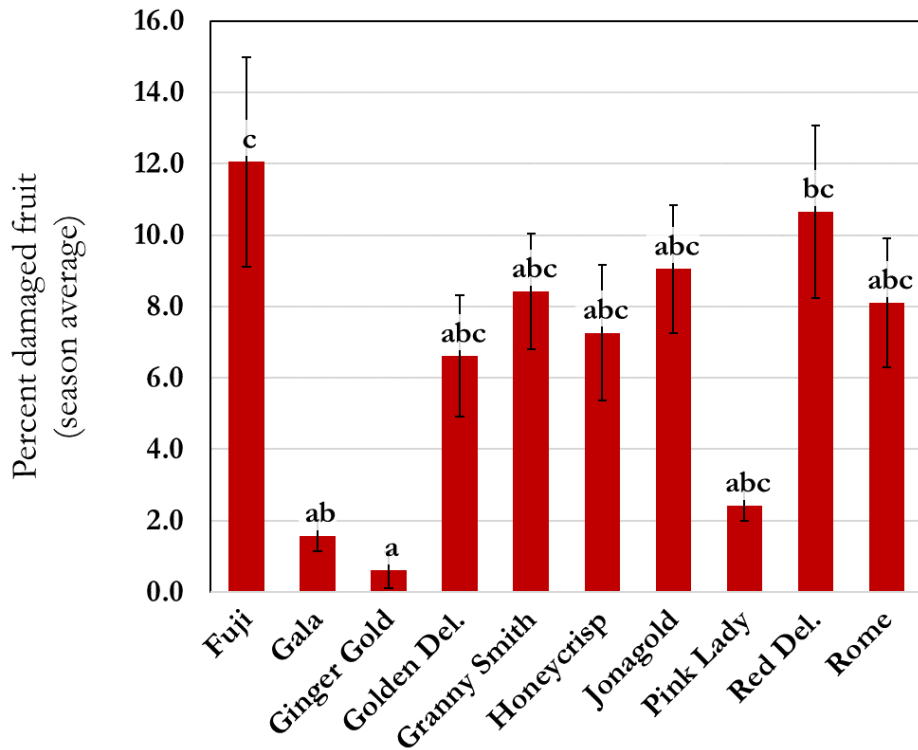


Not all Orchards or Apple Cultivars are Susceptible to BMSB Damage

- High temperatures limit distribution and pest status severity
 - Average daily temps $>82^{\circ}\text{F}$ during June and July reduce survival and reproduction.
- Orchards adjacent to wooded areas, especially with a diverse edge habitat, are most conducive to BMSB populations.
- Early maturing cultivars are less susceptible than later-maturing cultivars.

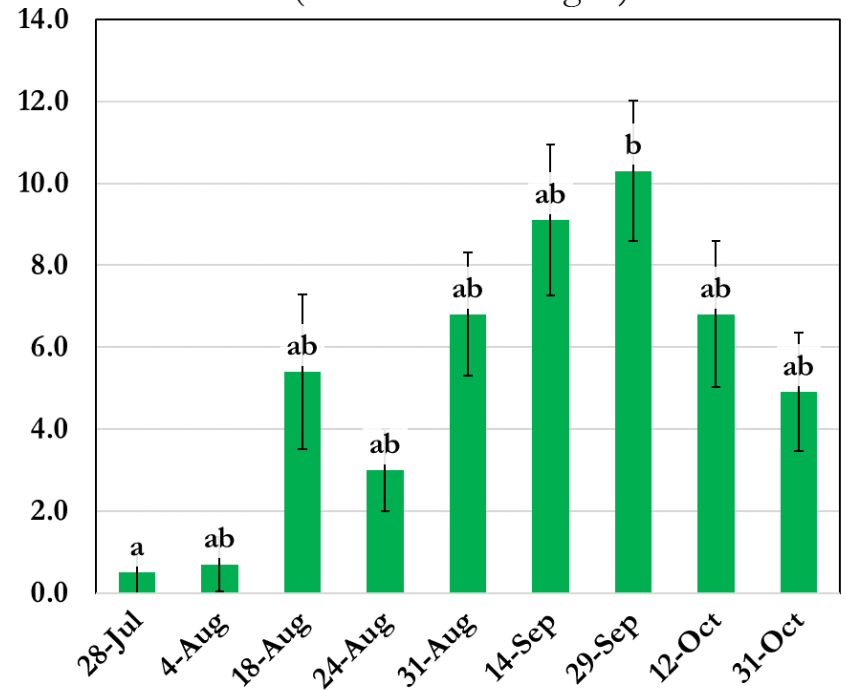
BMSB Damage by Cultivar and Harvest Date

Fruit Damage by Variety




Fruit Damage by Harvest Date

(all varieties averaged)



BMSB Insecticide Options on Tree Fruits

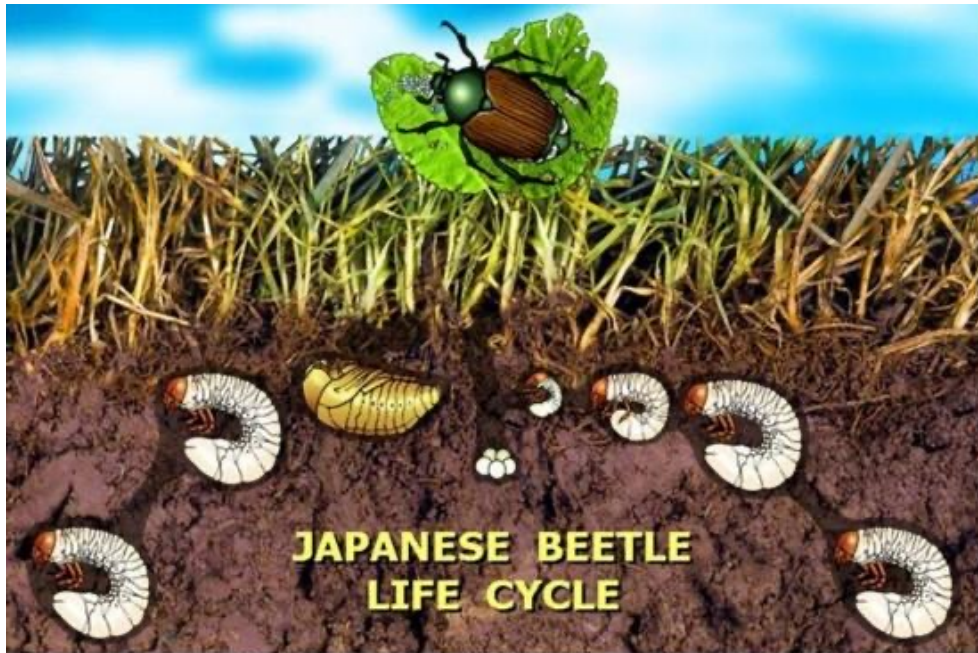
	Insecticide	Re-entry Interval (hours)	Pre-harvest Interval (days)
Neonic	Belay	12	7
	Actara	12	35
Pyrethroids	Danitol	24	14
	Mustang Max	12	14
	Brigade	12	14
	Warrior	24	21
	Proaxis	24	21
Mixtures	Besiege	24	21
	Endigo	24	35
	Voliam Flexi	24	35



Bifenthrin (Brigade, Fanfare)

- Formulations
 - 2EC (2.6 to 12.8 fl oz/A) = 0.04 – 0.2 lb AI
 - WSB (6.4 to 32 oz) = 0.04 to 0.2 lb AI
- Recommendation
 - 2EC at 6 oz/A, WSB at 16 oz/A
- Limitations
 - Do not exceed 0.45 lb AI/A per season
 - Do not exceed 3 applications per season
 - Do not make applications Less than 30 days apart
 - Do not apply within 14 days of harvest

Japanese Beetle and June Bug



JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC



Japanese Beetle and June Bug Insecticide Options

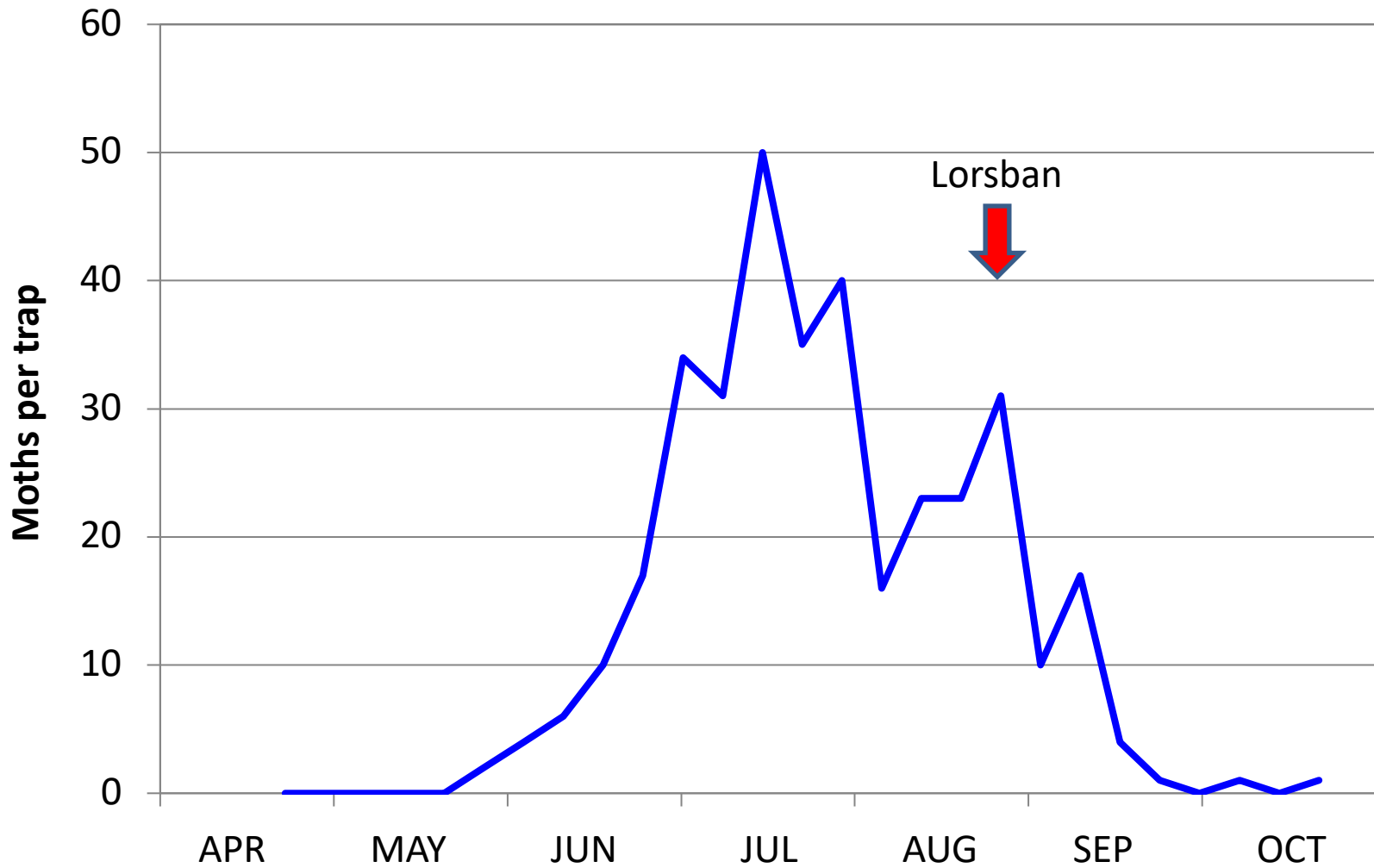
Insecticide	Approximate Residual Activity (days)	Pre-harvest Interval
Sevin	7	3
Imidan	7 to 10	14 (3-day REI)
Admire	3-5	0
Assail	3-5	7
Prethroids	7-10	
-Danitol		3
-Baythroid		7

Peachtree Borer

- Overwinters as larvae under bark a few inches above to below soil level.
- Can girdle young trees, debilitate older trees.
- 1 generation/year.
- Pheromone traps to monitor adult males



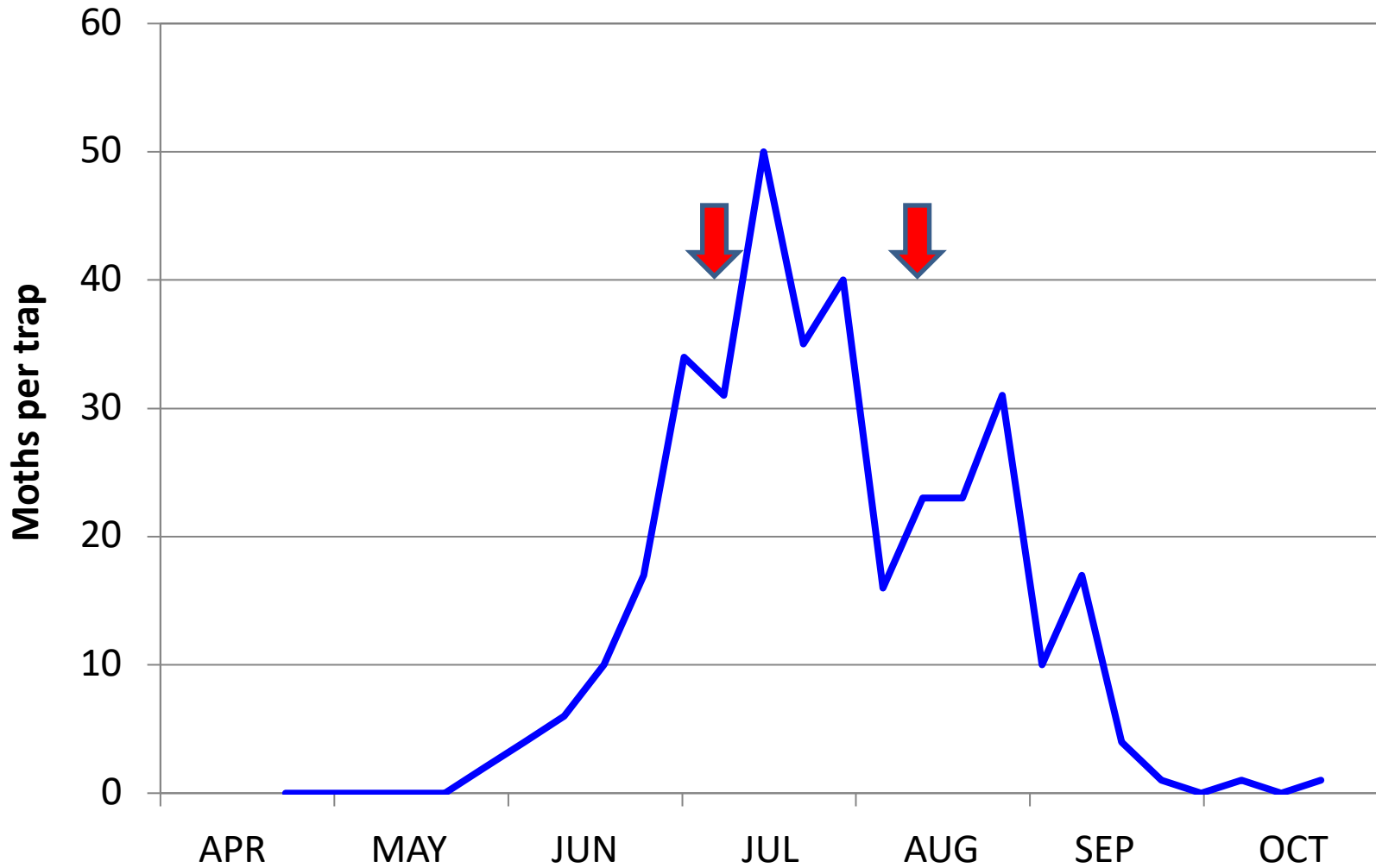
Peachtree Borer Flight Activity



Alternatives to Lorsban for PTB

- Pyrethroid with peachtree borer on label
 - Lambda-cyhalothrin (Warrior)
 - Permethrin (Permethrin, Ambush etc.)
 - Esvenvalerate (Asana)
 - Endigo (lambada-cy + thiamethoxam)
- Shorter residual activity requires multiple applications


Peachtree Borer Flight Activity



Mating Disruption Products

Both Products Control Peachtree and Lesser Peachtree Borer

LOT # _____




ISOMATE® PTB DUAL
A MATING DISRUPTION FORMULATION FOR LESSER PEACHTREE BORER (*Synanthedon pictipes*), GREATER PEACHTREE BORER (*Synanthedon exitiosa*)

ACTIVE INGREDIENTS:	
(E,Z)-3,13 Octadecadien-1-yl Acetate	43.46 %
(Z,Z)-3,13 Octadecadien-1-yl Acetate	43.07 %
OTHER INGREDIENTS	13.47 %
TOTAL	100.00 %

89.58 mg active ingredients per dispenser

Shorter release rate – <100 days

LOT # _____



ISOMATE® LPTB PLUS
A MATING DISRUPTION FORMULATION FOR LESSER PEACHTREE BORER (*Synanthedon pictipes*), GREATER PEACHTREE BORER (*Synanthedon exitiosa*)
FOR ORGANIC PRODUCTION

ACTIVE INGREDIENTS:	
(E,Z)-3,13 Octadecadien-1-yl Acetate	57.99 %
(Z,Z)-3,13 Octadecadien-1-yl Acetate	28.99 %
OTHER INGREDIENTS	13.02 %
TOTAL	100.00 %

90.44 mg active ingredients per dispenser

Longer release rate – 177 days

