

Managing Insect Pests Across the Season

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A Year of Pests

A handful of pests justifiably receive the most attention each year and usually about the same time each year. Some are active early, late or all season.

Occasionally, another pest or two must, usually unexpectedly, be managed.

The objective today is to cover several pecan insect pests, time of year the damage occurs and their control.

Obscure Scale

Protective scale covering

Live insect

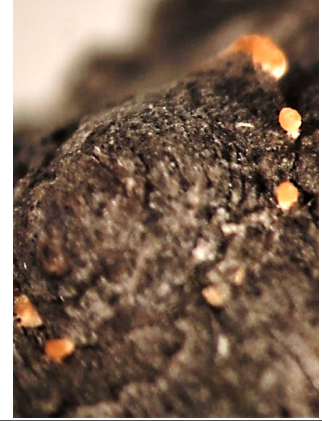
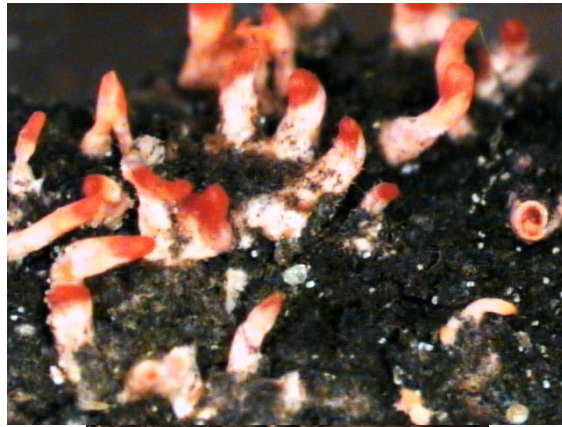
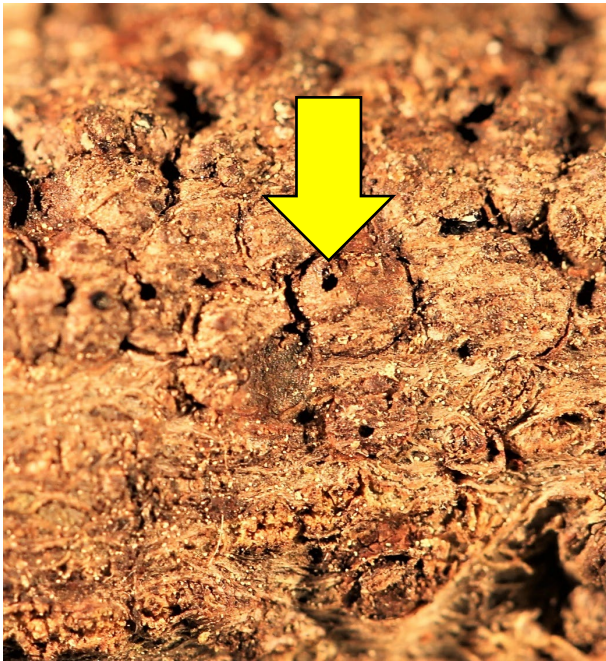


Obscure Scale Management:

Winter: Dormant oil. High volume provides better control (≥ 200 gpa) using up to 2% oil. Two applications 14 days apart are needed. Thorough coverage of the scale insect is required.

Summer: Eggs laid from early to mid-summer. Crawlers emerging from eggs are easy to kill. Pyriproxifen (Esteem), many contact insecticides...*but* pyrethroids are notorious for flaring scale populations.





Natural Enemies of the Obscure Scale:
Parasitic Wasp and a Fungus

Ambrosia Beetles

Ambrosia beetles are attracted to ethanol.

When trees are stressed by lack of oxygen, they may produce lactic acid and then quickly switch to produce ethanol. This metabolic pathway allows cells to produce just enough energy to endure short periods of low oxygen or no oxygen.

Synthesized ethanol may move rapidly up the stem in the sapwood water column that supplies water to the leaves. This keeps the ethanol concentration low inside the trees and allows healthy trees to survive brief periods of stress. However, *if ethanol accumulates and then escapes from the tree, it serves as a signal to certain insects that the tree is stressed.*



Granulate Ambrosia Beetle
Photo by Pest and Diseases Image
Library, Bugwood.org



Ambrosia Beetle sawdust toothpicks
Photo by UGA Cooperative
Extension Service

Managing Ambrosia Beetles Attacking Pecan

Decrease stress on young trees to reduce ethanol production: adequate soil type, soil moisture, proper nutrition, etc.

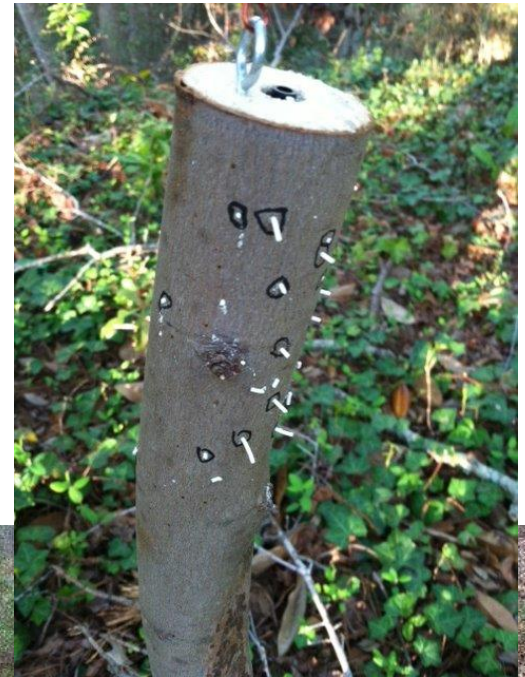
Maintaining healthy trees is the best defense against Ambrosia beetles.

Monitor ambrosia beetle flight with ethanol traps between woods and orchard. When flight is detected, known weak trees should be treated every 7 days with permethrin (or another pyrethroid). “Healthy” trees bordering woods should be scouted for Ambrosia beetle sawdust toothpicks and treated when first seen.

A silver lining regarding Ambrosia beetle attacks on pecan?

Given that ambrosia beetles attack stressed/weakened trees, maybe these attacked trees can be useful to:

- 1) identify weakened trees to be replaced.
- 2) identify unsuitable sites for pecan production.



Pecan Bud Moth

Can cause problems on nursery stock and young pecan trees. Present all season but generally regarded as an early season.

The adult insect overwinters and begins laying eggs on stems near buds at budbreak. More eggs are later laid on the upper surface of leaves.

Larvae feed on leaves and within buds and shoots which may cause *multiple branching and lateral branch growth*.

Control relies on targeting the eggs and the larvae BEFORE entering the bud/shoot.

Products used against Pecan Nut Casebearer and Hickory Shuckworm are effective.



Adult Pecan Bud Moth
Photo by Mark Dreiling, Bugwood.org



Phylloxera

Three species:

Pecan leaf phylloxera

Southern pecan leaf phylloxera

Pecan phylloxera

*Need for control is based on
orchard history.*

Apply neonicotinoid (e.g.,
imidacloprid) products at
budbreak.



May Beetles

Larvae feed on grass roots. Adults feed on foliage of many plant species. Orchards near pastures may be susceptible to increased damage.

Control:

If in a susceptible area - soon after budbreak, newly planted and young trees should be scouted daily for damage. Treat with an insecticide when damage is found.

Carbaryl and many other contact insecticides work well.

Beetles are present all summer but once foliage expands, damage is not as problematic.





**Suspected May Beetle
Feeding Damage on Nuts**

Pecan Nut Casebearer Managing 1st Generation



PNC: First Capture at Byron, GA

• P

| <u>Year</u> | <u>Date</u> |
|-------------|----------------|
| 2005 | May 9 |
| 2006 | April 28 |
| 2007 | April 25 |
| 2008 | April 28 |
| 2009 | April 29 |
| 2010 | April 27 |
| 2011 | April 27 |
| 2012 | April 6 |
| 2013 | April 29 |

s if



Pecan Nut Casebearer

Managing 1st Generation



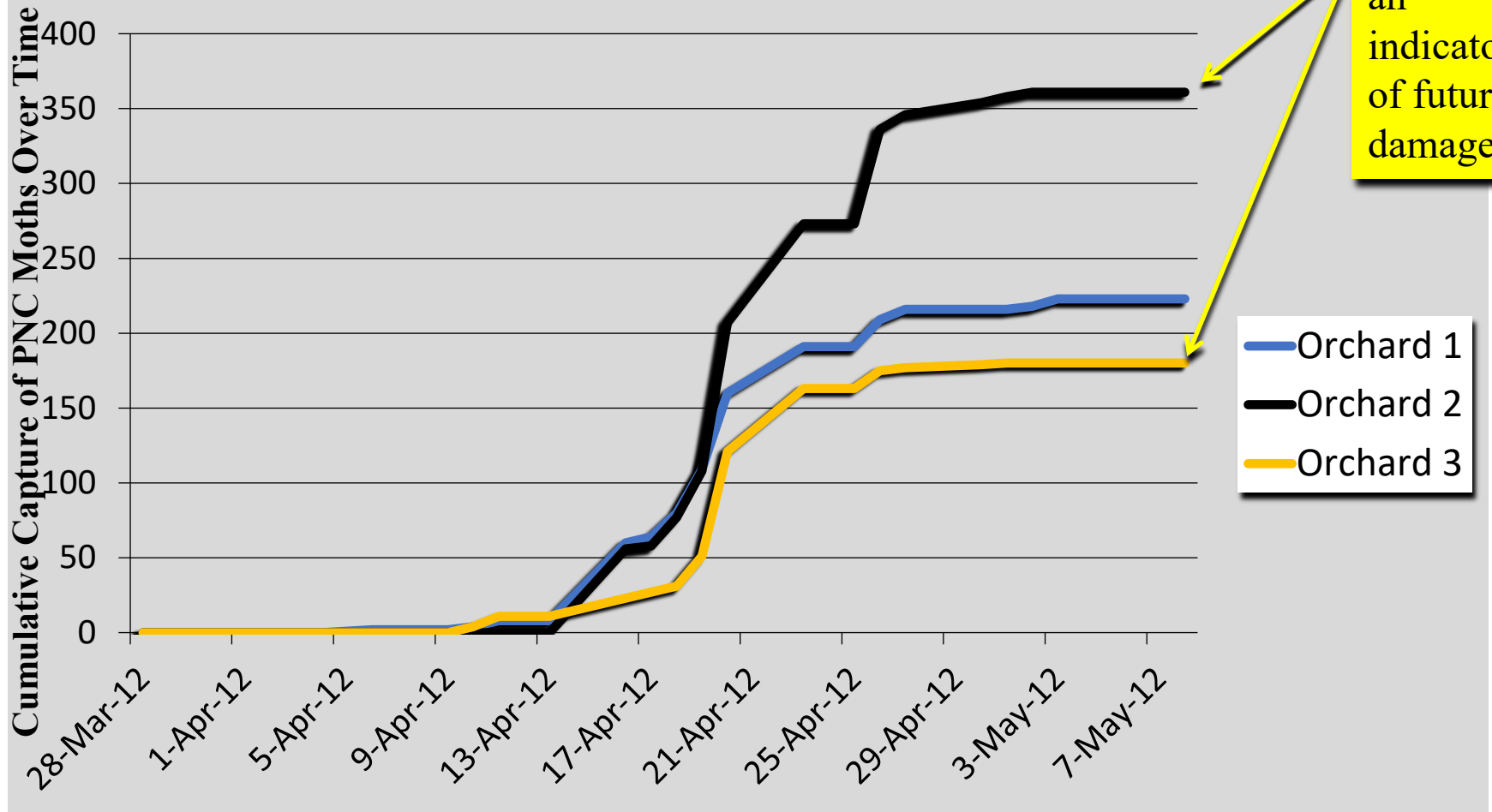
- Scout orchard for PNC eggs on nutlets 7-10 days after capturing the first PNC adult in a trap. Use a hand lens to aid in this process.
 - *If an insecticide treatment is needed*, it is typically applied to the orchard 2 weeks after the first male moths are captured in traps.
- *Do not apply insecticide due to high trap capture.*
 - If an application is warranted, application based on high trap capture usually results in the application being made too early to provide needed residual activity for PNC control.
- Trap capture (low or high) DOES NOT indicate whether an insecticide needs to be applied.

Tips for scouting PNC

- Start scouting for PNC eggs on nutlets 7-10 days after capturing the first PNC in pheromone traps.
- Examine 10 nut clusters/tree on 31 trees
 - If you find ≥ 2 infested clusters (eggs or nut entry) before sampling all trees, apply an insecticide within the next few days.
 - Mark some infested nut clusters with ribbon to determine egg hatch. Newly laid eggs are white but turn pink/red before hatching. Apply insecticide 1-2 days after egg hatch.
 - Scout for infested clusters again 5-7 days later.
 - If you find < 2 infested clusters, sample again 2-3 days later.
 - If you then find ≥ 2 infested clusters, immediately apply treatment.
 - If no treatment is needed, sample again 2 days later. This sample is very important if weather conditions have been cool or rainy.

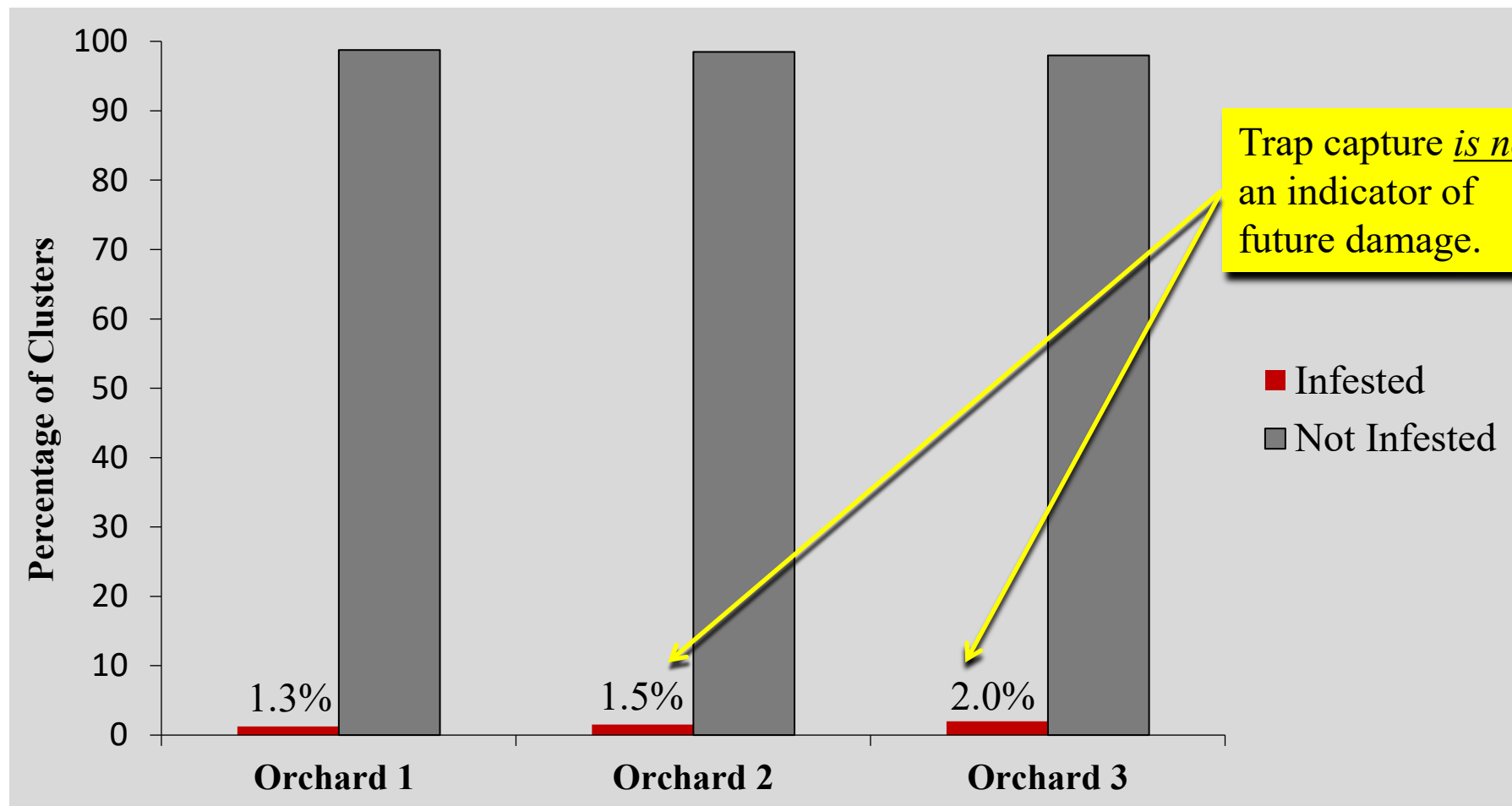


2012 PNC Trap Capture, Byron, GA



Data collected from 3 PNC traps/orchard

Percentage PNC Infested Nut Clusters in Unsprayed Pecan Orchards: May 31, 2012

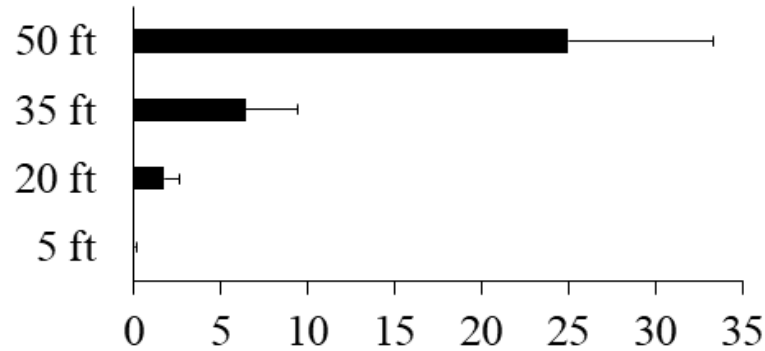


Sampled 20 nut clusters per tree on 20 trees in each orchard

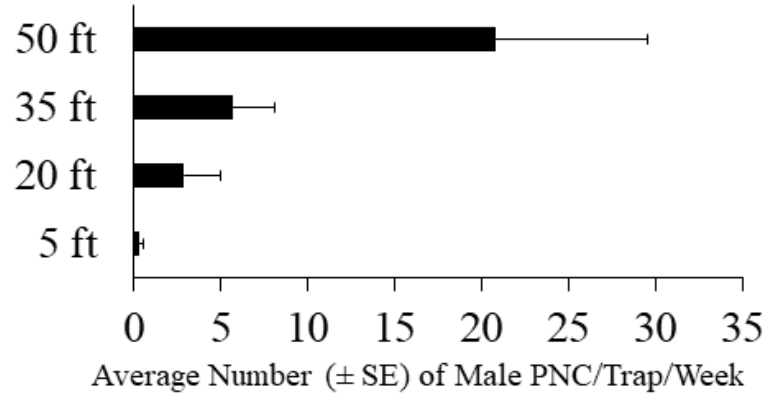
PNC Capture at Different Canopy Heights



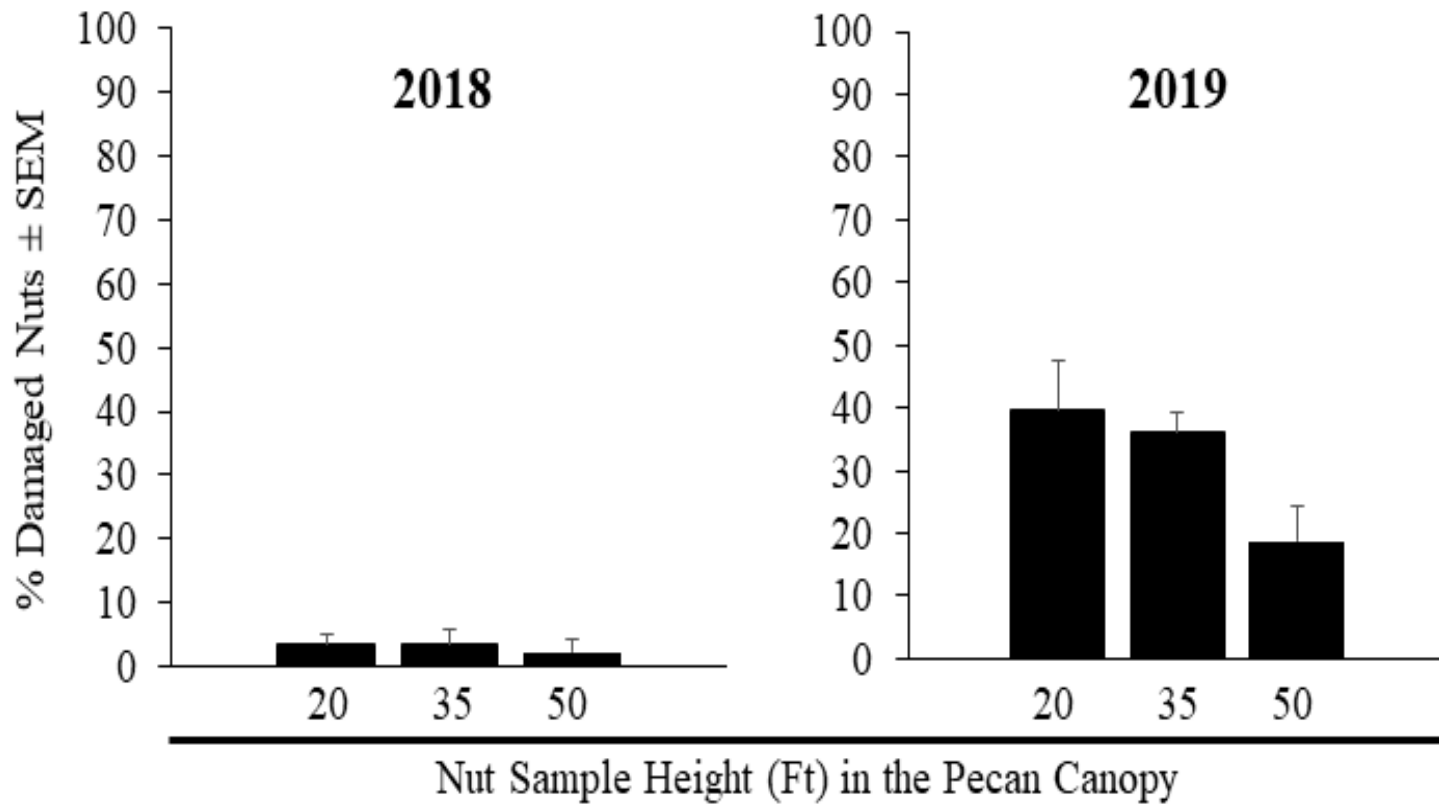
2018



2019



PNC Nut Damage: 2018 vs. 2019



The presence of male PNC in traps provides NO information regarding % nut infestation.

Hickory Shuckworm (HSW)

- HSW attacks pecan from June through harvest.
- First generation attacks hickory nuts (which set nuts earlier than pecan).
- Few pecans are infested with HSW before June (too small).



Hickory Shuckworm (HSW)

➤ Adult emergence from overwintered pecan shucks

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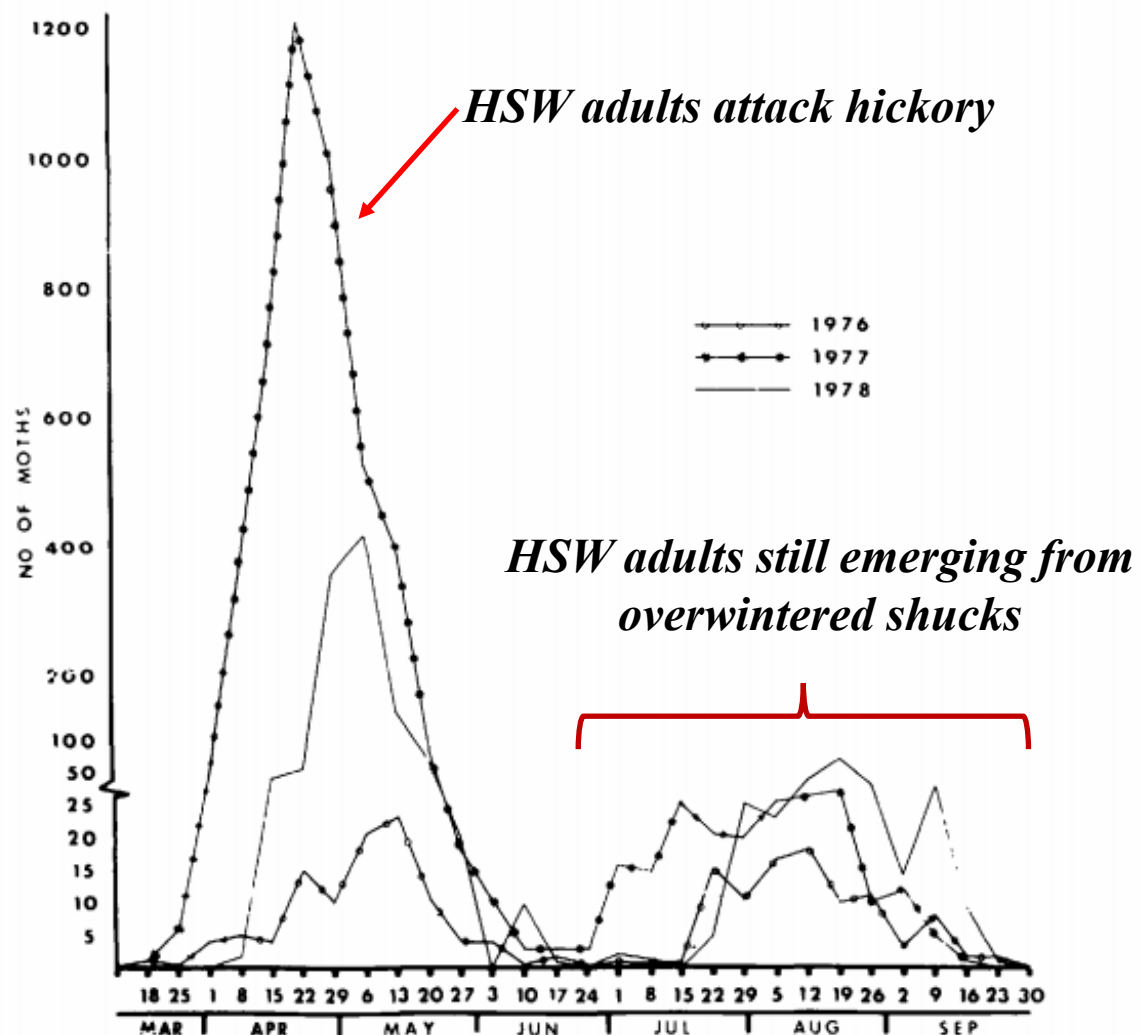


FIG. 1.—Hickory shuckworm moths emerging weekly from overwintering pecan shucks, 1976–78.

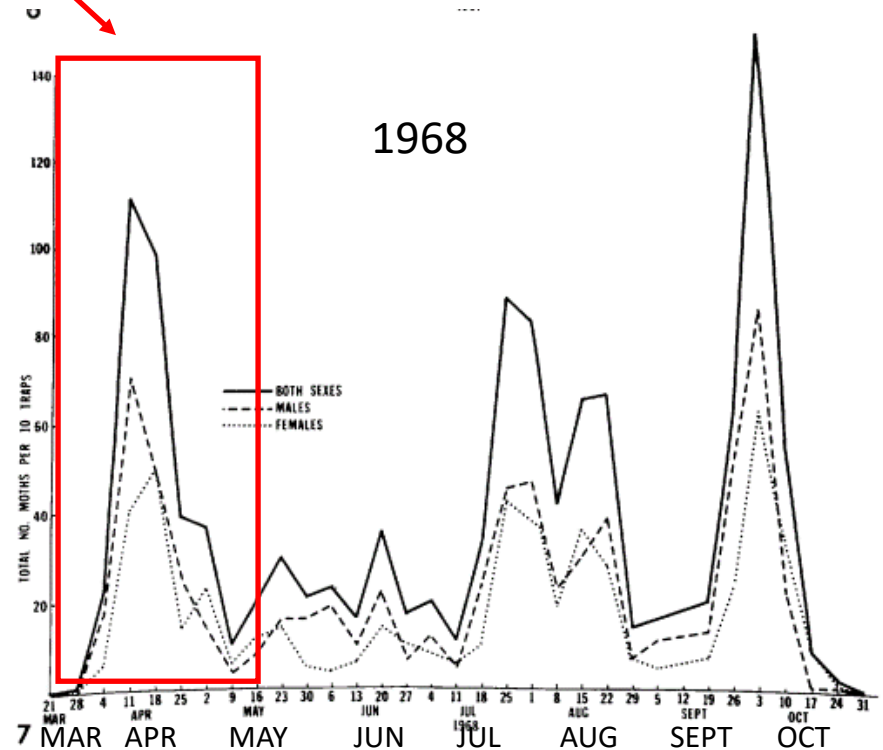
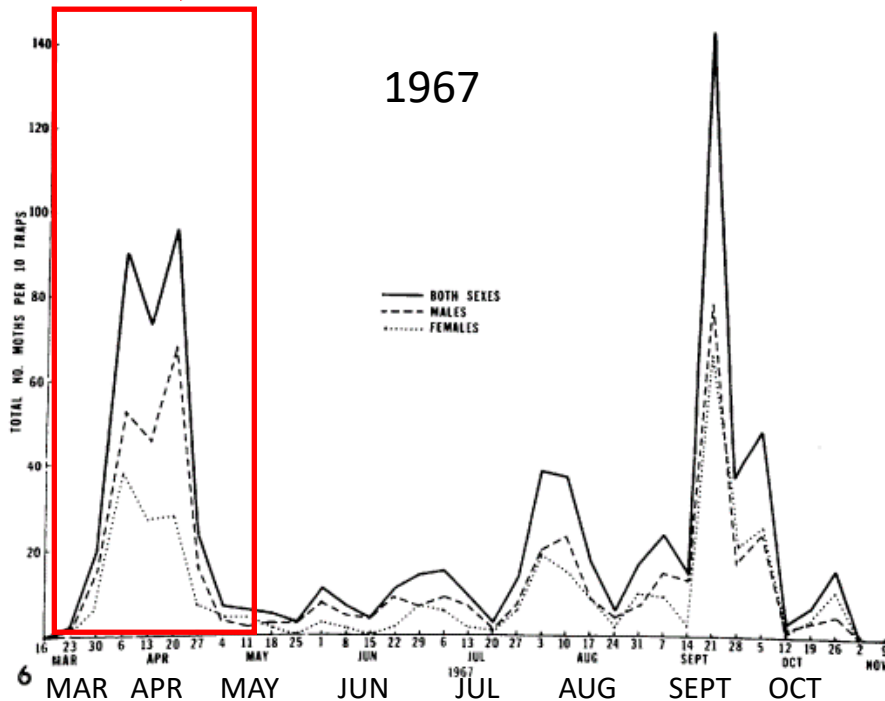


Calcote and Hyder.
1979. J. Econ.
Entomol. 72: 701-702.

Hickory Shuckworm (HSW)

➤ Adults captured in light traps

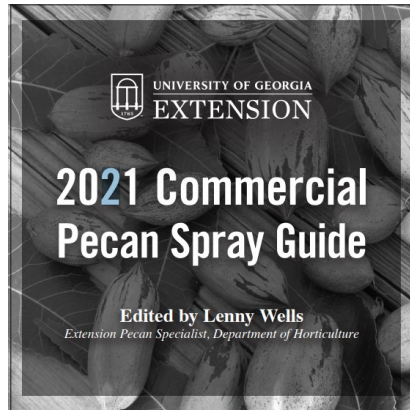
1st generation attacks hickory



Tedders, Hartsock and Osburn. 1972. J. Econ. Entomol. 65: 148-155.

Management of Pecan Nut Casebearer & Hickory Shuckworm

- Timing of insecticide application to closely coincide with egg hatch is critical because larvae tunnel into nuts.



| | |
|----------------------|--|
| Pecan Nut Casebearer | chlorantraniliprole 4E Lorsbanchlorfos |
| | <i>spinosad</i> Spintor 2SC |
| | <i>diflubenzuron</i> Dimilin 2L |
| | <i>clothianadin</i> Belay |
| | <i>methoxyfenozide</i> Intrepid 2F |
| | <i>methoxyfenozide + spinetoram</i> Intrepid Edge |
| | <i>tolfenpyrad</i> Apta |
| | <i>cyantraniliprole + abamectin</i> Minecto Pro |

| | |
|-------------------|--|
| Hickory Shuckworm | chlorantraniliprole 4E Lorsbanchlorfos |
| | <i>clothianadin</i> Belay |
| | <i>diflubenzuron</i> Dimilin 2L |
| | <i>methoxyfenozide</i> Intrepid 2F, Turnstyle |
| | <i>methoxyfenozide + spinetoram</i> Intrepid Edge |
| | <i>tolfenpyrad</i> Apta |
| | <i>abamectin + cyantraniliprole</i> Minecto Pro |
| | <i>chlorantraniliprole + lambda-cyhalothrin</i> Besiege |

Blackmargined Aphid and Yellow Pecan Aphid

During the early season, leave natural populations alone. Natural enemies will take them out and in so doing will also maintain black pecan aphid at low levels.

If broad spectrum insecticides (e.g., pyrethroids, dimilin) are used early season for other reasons, aphids may require management.

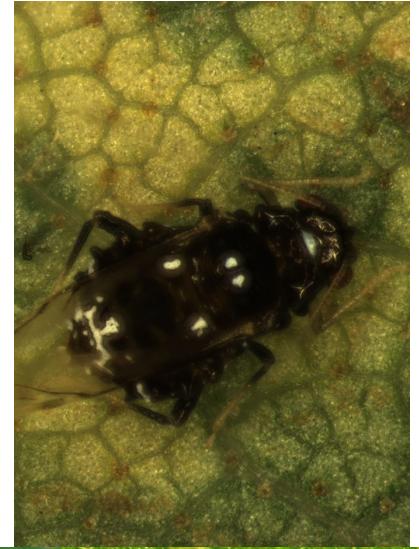
Late season – be ready to include an aphicide when managing pecan weevil, hickory shuckworm and/or stink bugs. Many products are available for aphid management.



The Black Pecan Aphid

Generally – a late season pest. (*Beware of low, natural populations of blackmargined and yellow pecan aphids during the early season!*)

From the spray guide: Carefully check all compound leaves on 10 terminals per tree, on at least 10 trees per orchard for the presence of black pecan aphids. Prior to July 1, treat if 25% of terminals have 2 or more black aphids. After July 1, treat if 15% of terminals have more than one black aphid and nymph clusters are found. Concentrate checks on susceptible cultivars such as Schley, Sumner, and Gloria Grande. Be sure to check all compound leaves on each terminal examined.



Aphid Management Options

End of Season: options may include contact insecticides (e.g., pyrethroids, organophosphates).

BE AWARE of the PHI!

Apply these early season and deal with aphids/mites the rest of the season.

Stink Bugs

Typically, “managed” as a late-season pest but can feed on nuts at any time of the season. Notoriously difficult to visually sample on pecan.

Be aware of orchard surroundings (woods, row crops, fallow fields) that foster stink bugs and changes in those surroundings that cause stink bugs to move to pecan. Stink bugs feed mostly on developing seeds and populations constantly move in search of the ‘best’ food source available.

Addition of thiamethoxam increases activity of most products against stink bugs. Bifenthrin has best standalone and residual activity.



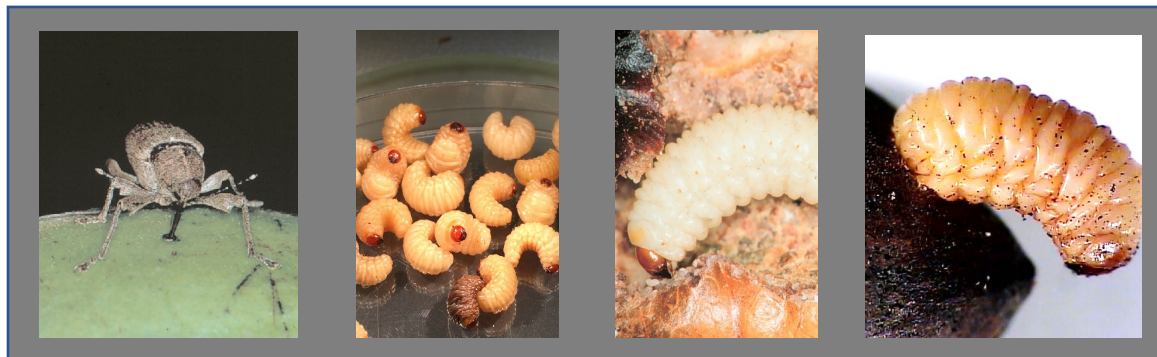
Pecan Weevil

Pecan weevil attacks all species of hickory in North America. Infestation of young orchards and re-infestation of older orchards is always possible/happening.

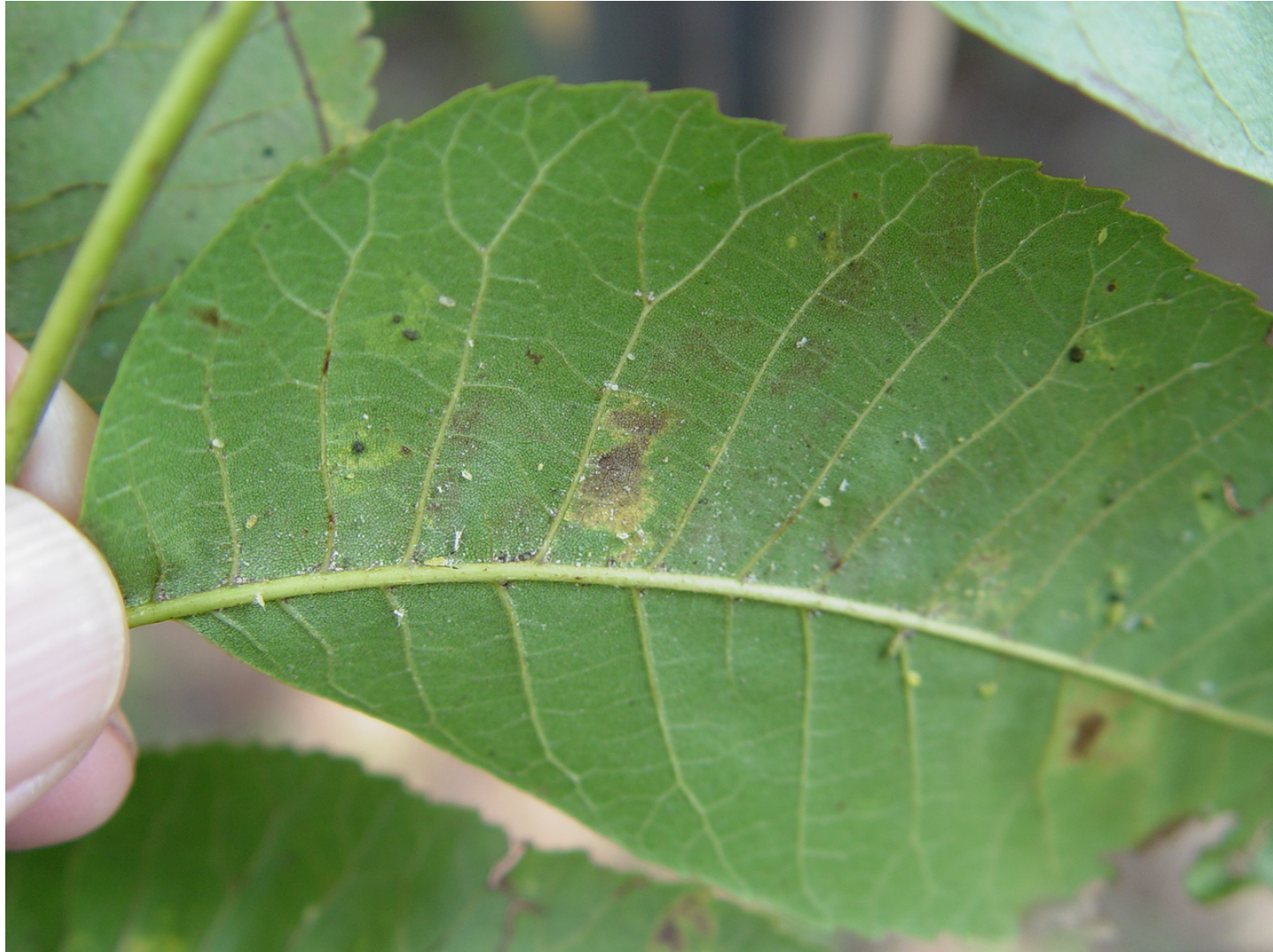
If pecan weevil is not a problem, still look for nuts with emergence holes.

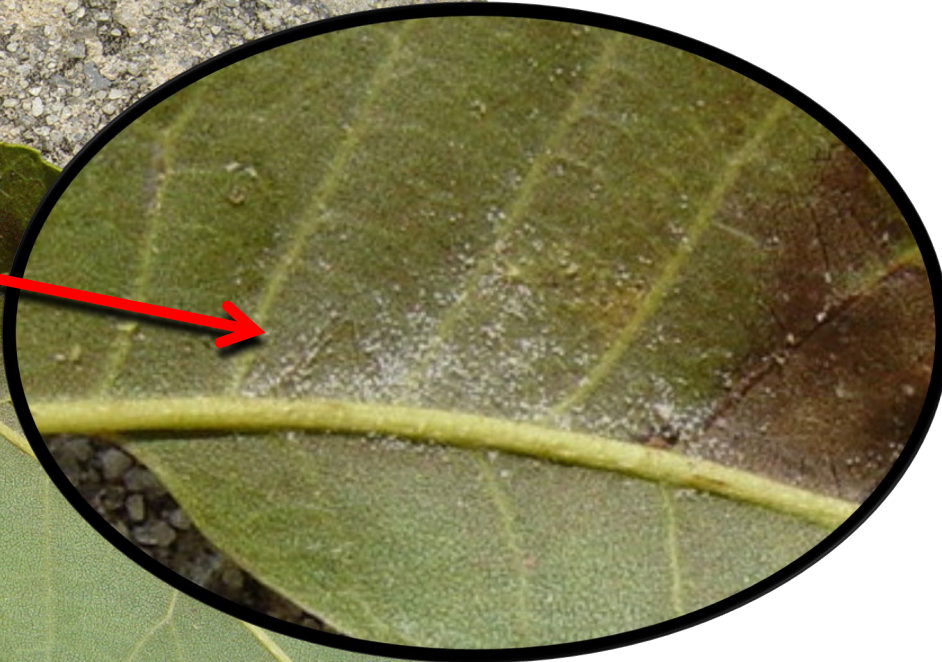
Where pecan weevil does occur, monitor adult emergence (various traps) and treat. Nuts attacked before the shell hardens will drop, but after shells harden, female oviposition in nuts leads to larvae developing within the nut.

At Byron, GA. Peak weevil emergence is the 3rd week of Aug. If dry in August, spray within 24 h after a good rain. Carbaryl and pyrethroids – *be wary of aphids and mites.*



Detecting Pecan Leaf Scorch Mites





Examples of Leaf Injury not caused by Mites



Mite Management

| | |
|----------------------|---|
| Mites | <i>abamectin</i> Agri-Mek SC, Abba, and others |
| | <i>bifenazate</i> Acramite 4SC |
| Mites (continued) | <i>spirodiclofen</i> Envidor 2SC |
| | <i>fenpyroximate</i> Portal |
| | <i>pyridaben</i> Nexter SC |
| | <i>hexythiazox</i> Savey 50DF |
| | <i>etoxazole</i> Zeal SC |
| | <i>fenazaquin</i> Magister SC |



Acknowledgments

- Mention of trade names or commercial products in this article is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the United States Department of Agriculture.