Managing Pests and Beneficials in Pecan

Eddie Kyle Slusher
Texas A&M University AgriLife Research and Extension Center, Stephenville, TX

Nut Pests

Pecan Nut Casebearer*

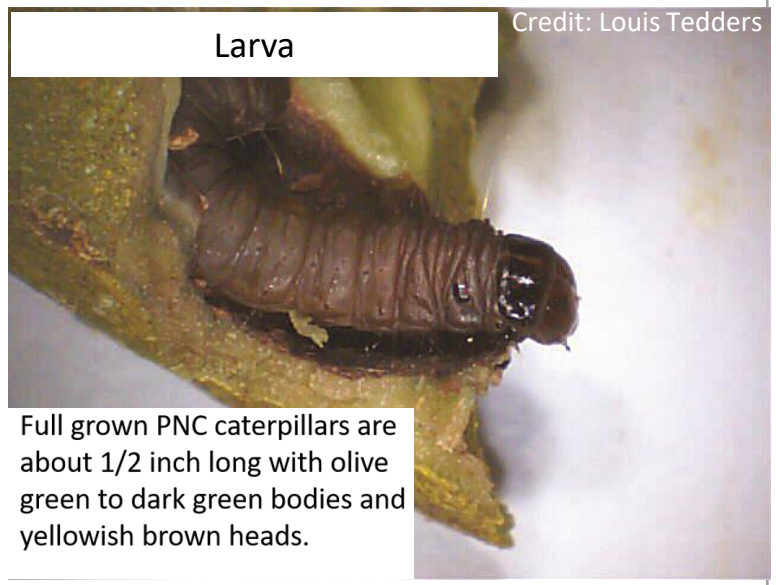
- Found across all pecan growing regions of Texas.
- 4+ generations per year.
- 1st generation is often the most destructive (April – June).


Credit: Angel Acebes

It has a ridge or tuft of dark scales extending across the middle of each front wing.


Credit: Jerry Payne

Adult


Credit: Louis Tedders

Larva

Full grown PNC caterpillars are about 1/2 inch long with olive green to dark green bodies and yellowish brown heads.

Pecan Nut Casebearer

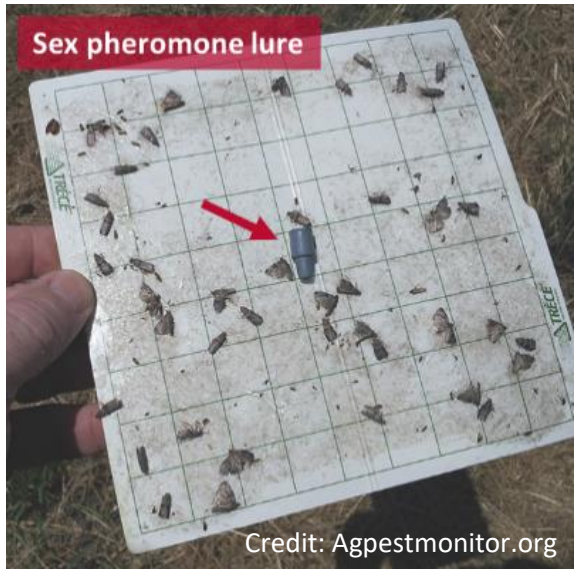
- Females can lay 50 – 150 white eggs within their lifespan, eggs turn pink or red prior to hatching.

EGGS

The eggs are flat, very small, and white when newly laid. They develop red lines after two or three days and turn entirely red before hatching.

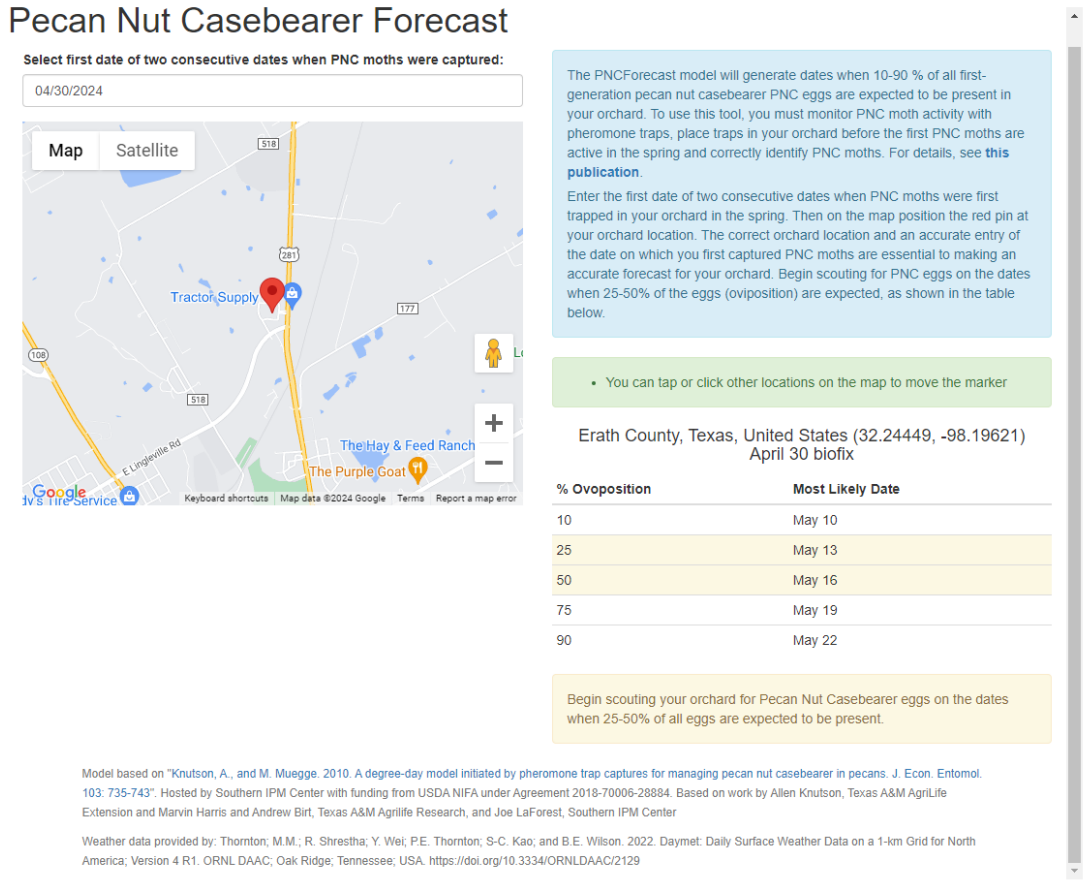
Pecan Nut Casebearer Management

- Monitoring is critical to spraying at the proper time.
- **Biofix**: Capture a least one moth for two consecutive days a site (deploy traps in April).
- After Biofix is reached, start scouting for eggs 7-10 days after first capture. Scout 10 nutlet clusters randomly across the orchard, if two are infested with eggs. Eggs turn red 3-5 days before hatching.
- Apply insecticide two days after hatch to kill larva before they enter the pecan.



Pesticide	MOA
Spinosad	5
Diflubenzuron	15
Chlorantraniliprole	28
Clothianadin	4A
Methoxyfenozide	18
Methoxyfenozide + Spinetoram	5 + 18
Tolfenpyrad	21
Cyantraniliprole + Abamectin	6 + 28

Pecan Nut Casebearer Management



Pecan Nut Casebearer Forecast

Select first date of two consecutive dates when PNC moths were captured:

04/30/2024

The PNCForecast model will generate dates when 10-90 % of all first-generation pecan nut casebearer PNC eggs are expected to be present in your orchard. To use this tool, you must monitor PNC moth activity with pheromone traps, place traps in your orchard before the first PNC moths are active in the spring and correctly identify PNC moths. For details, see **this publication**.

Enter the first date of two consecutive dates when PNC moths were first trapped in your orchard in the spring. Then on the map position the red pin at your orchard location. The correct orchard location and an accurate entry of the date on which you first captured PNC moths are essential to making an accurate forecast for your orchard. Begin scouting for PNC eggs on the dates when 25-50% of the eggs (oviposition) are expected, as shown in the table below.

- You can tap or click other locations on the map to move the marker

Erath County, Texas, United States (32.24449, -98.19621)
April 30 biofix

% Oviposition	Most Likely Date
10	May 10
25	May 13
50	May 16
75	May 19
90	May 22

Begin scouting your orchard for Pecan Nut Casebearer eggs on the dates when 25-50% of all eggs are expected to be present.

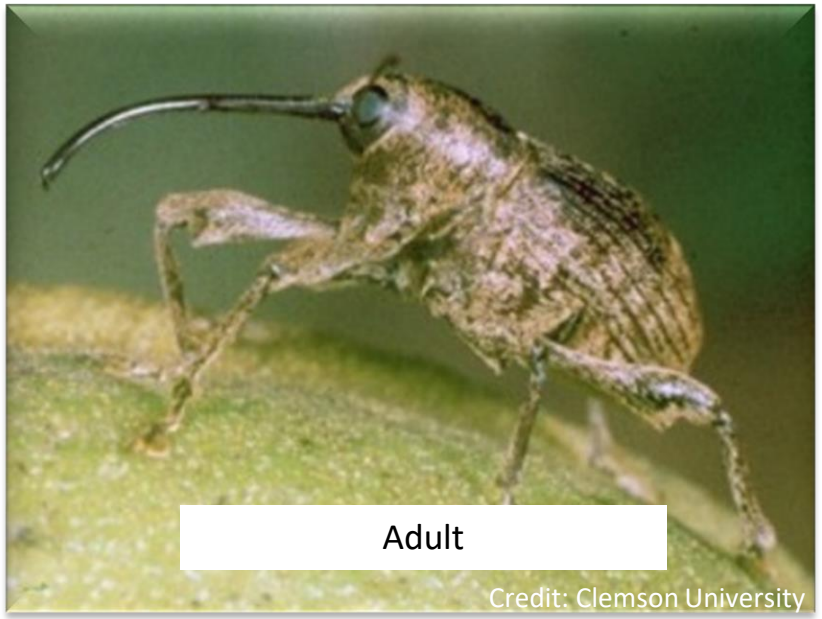
Model based on "Knutson, A., and M. Muegge. 2010. A degree-day model initiated by pheromone trap captures for managing pecan nut casebearer in pecans. J. Econ. Entomol. 103: 735-743". Hosted by Southern IPM Center with funding from USDA NIFA under Agreement 2018-70006-28884. Based on work by Allen Knutson, Texas A&M AgriLife Extension and Marvin Harris and Andrew Birt, Texas A&M Agrilife Research, and Joe LaForest, Southern IPM Center

Weather data provided by: Thornton; M.M.; R. Shrestha; Y. Wei; P.E. Thornton; S-C. Kao; and B.E. Wilson. 2022. Daymet: Daily Surface Weather Data on a 1-km Grid for North America; Version 4 R1. ORNL DAAC; Oak Ridge; Tennessee; USA. https://doi.org/10.3334/ORNLDAAC/2129

https://pecan.agpestmonitor.org/ipmtoolbox/forecast/

Pecan Weevil*

- Present in most counties in the state.
- Emerge from the soil in late summer – early fall (July – October).
- Adults feed on pecan nut kernels prior to shell hardening (Usually water stage). Oviposition by females can also cause damage.
- Females will lay eggs (2-4 per nut) onto the kernel and larvae will feed on the kernel after hatching.


Adult
Credit: Clemson University

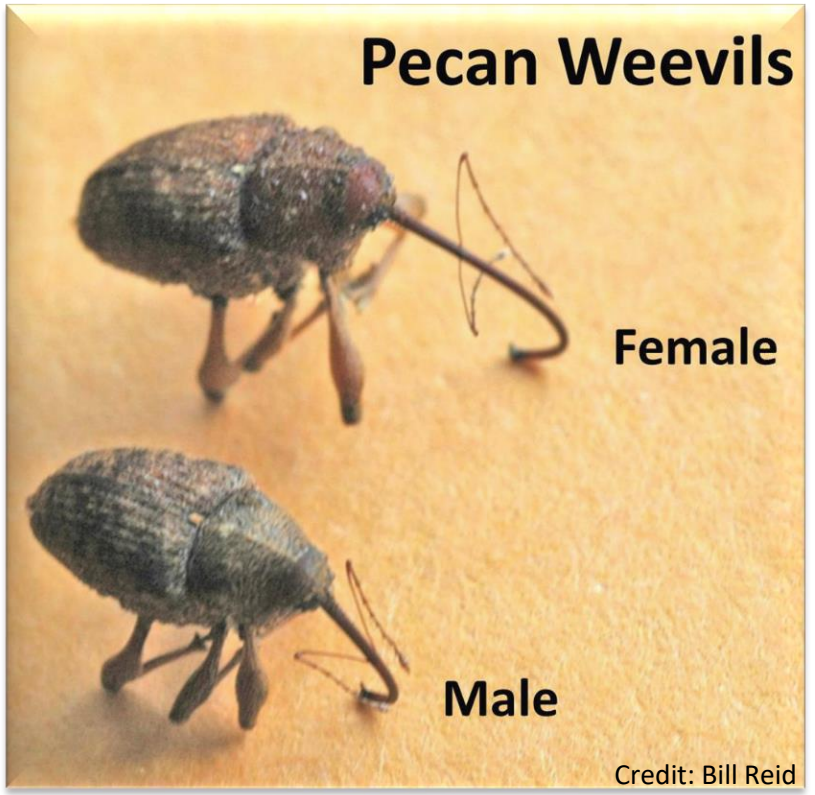

Credit: Jerry Payne


Larva
Credit: Clemson University

Pecan Weevil

Credit: Bill Reid

Credit: Clemson University



Credit: Bill Reid

Pecan Weevil Management

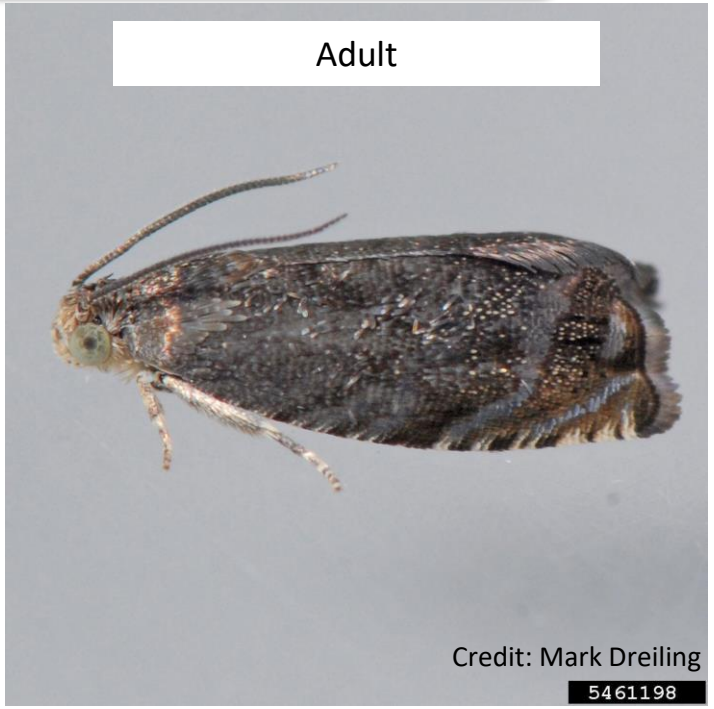
- Monitoring : Circle Traps or Pyramid Traps
- Management options:
  - Insecticides (See table) – only effective on emerging adults
  - Entomopathogenic nematodes – can hit underground stages
- Prevent the spread: Carefully monitor harvest for infested nuts, destroy infested nuts and do not transfer potentially infested stock into weevil-free areas.

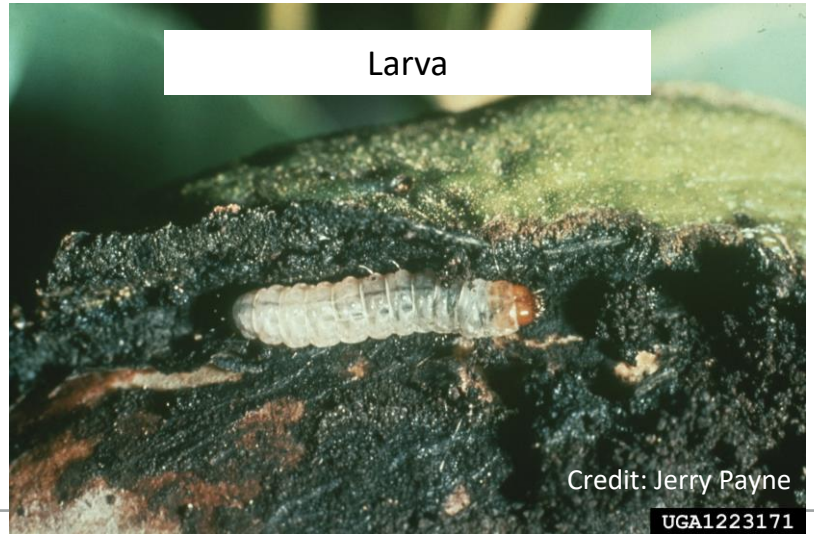
Pesticide	MOA
Carbaryl	1A
Chromobacterium subtsugae	UNK
Pyrethroids	3


Credit: Kyle Slusher

Hickory Shuckworm

- Adults emerge in March and April prior to nut formation, lay eggs on phylloxera galls and hickory nuts.
- After nut formation, eggs are laid on developing nuts.
- Damage:
  - Prior to shell hardening: Nut drop
  - Post shell hardening: poor kernel development, shuck sticking, scarring and discoloration of shell.
- Management:
  - Treat with insecticide when pecan reaches half-shell hardening stage, 2nd application 10-14 days later (if needed).
  - Destroy old shucks to eliminate overwintering larvae.
  - Phylloxera management





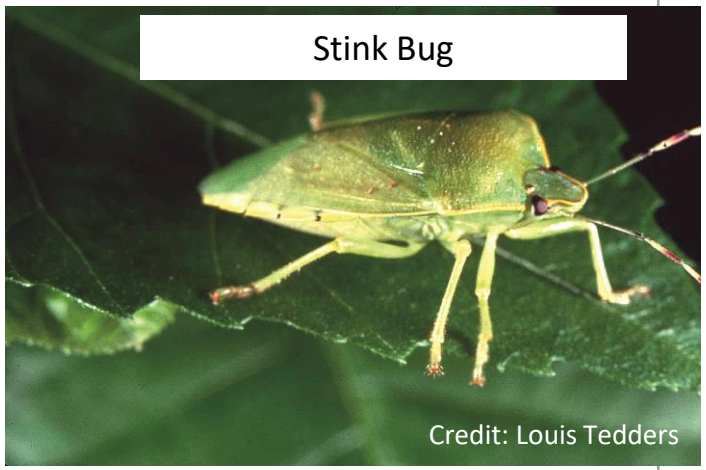
Pesticide	MOA
Chlorantraniliprole	28
Clothianadin	4A
Diflubenzuron	15
Methoxyfenozide	18
Methoxyfenozide + Spinetoram	5+18

Pesticide	MOA
Tolfenpyrad	21A
Abamectin + Cyantraniliprole	6 + 28
Chlorantraniliprole + Lambda-cyhalothrin	3 + 28

Leaf-footed Bug/Stink Bugs

- Several species of each feed on pecan.
- Damage:
  - Pre-Shell Hardening: Fruit abscission
  - Post-Shell Hardening: Kernel turns where mouthparts are inserted. These spots make the kernel taste bitter.
- Management:
  - Treat when 1 stink bug is found per 40 terminals.
  - Timing treatment is difficult, as insects move in and out of the orchard year-round
  - Manage weeds around orchard
  - Trap crops

Pesticide	MOA
Bifenthrin	3A
Lambda-cyhalothrin and thiamethoxam	3A and 4A
Lambda-cyhalothrin	3A
Ztea-cypermethrin	3A

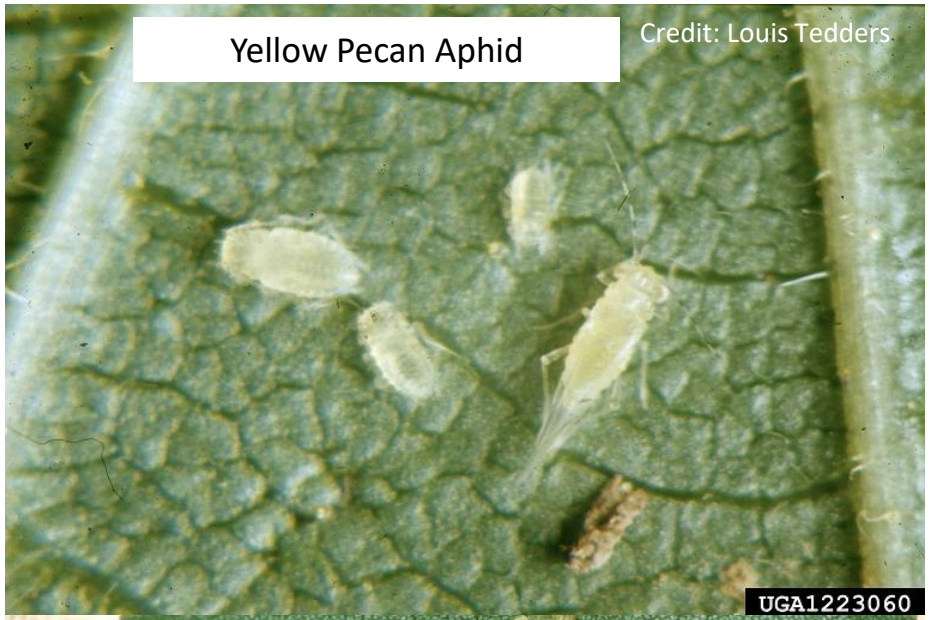


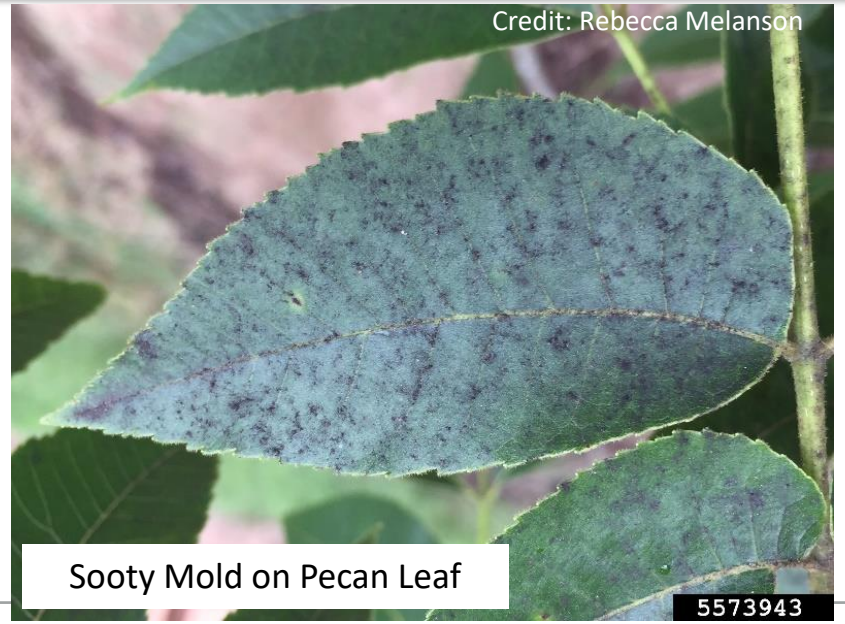
Other Potential Pests of Nuts

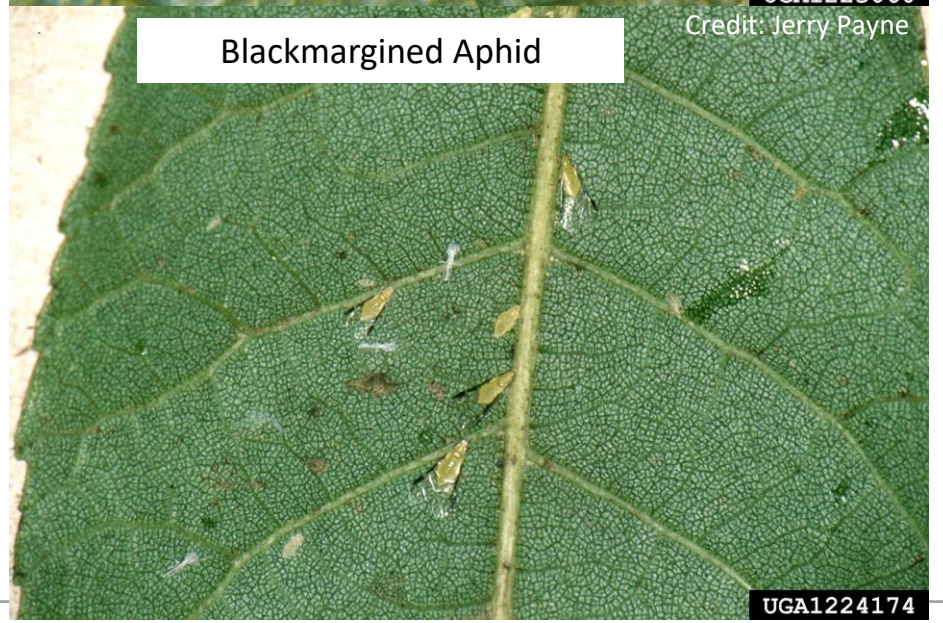
Foliage Pests

Yellow Aphid Complex*

- Emerge in March, can remain in orchards up until November.
- Damage:
  - Extract nutrients and water from the plant while feeding.
  - Cause vascular damage at feeding site.
  - Produce honeydew as a byproduct of feeding, accumulation of honeydew can promote the growth of sooty mold on the leaf.







Black Pecan Aphid*

- Emerge in March, can remain in orchards up until November. Usually don't develop to damaging populations till later in the growing season (August – November).
- Damage:
  - Extract nutrients and water from the plant while feeding.
  - Cause vascular damage at feeding site.
  - Produce honeydew as a byproduct of feeding, accumulation of honeydew can promote the growth of sooty mold on the leaf.
  - Chlorotic Symptom

Pecan Aphid Management

- DO NOT treat aphids in the early season if they are only insect problem. Beneficial insects (Parasitoids, Lady beetles, and Lacewing) can suppress these populations.
- Pyrethroids should not be used in early to mid-season applications (can cause aphid flare).
- Rotate among insecticides to prevent resistance to a certain MOA.

Pesticide	MOA
Acetamiprid	4A
Afidopyropen	9D
Clothianidin	4A
Flonicamid	9C
Flupyradifurone	4D
Imidacloprid	4A

Pesticide	MOA
Pymetrozine	9B
Pyridaben	21
Pyrifluquinazon	9B
Sulfoxaflor	4C
Thiamethoxam	4A
Tolfenpyrad	21A

Phylloxera

- Form galls on the leaves, shoots, catkins, and nuts.
- In severe outbreaks, can cause defoliation, reduce yield, and decrease tree vitality.
- Galls are used as shelter for hickory shuckworm larvae.
- Management: Treat at budbreak if there has been a recent history of infestation.

Pesticide	MOA
Imidacloprid	4A
Thiamethoxam	4A

Pecan Leaf Scorch Mite

- Feeding causes scorching of the leaf and early leaf drop.
- Form groups under a silken web near the mid-vein.
- Management:
  - Scout regularly from late June till harvest, only apply when damaging infestations occur.
  - Carbaryl and pyrethroid can flare scorch mites, so only spray if necessary.

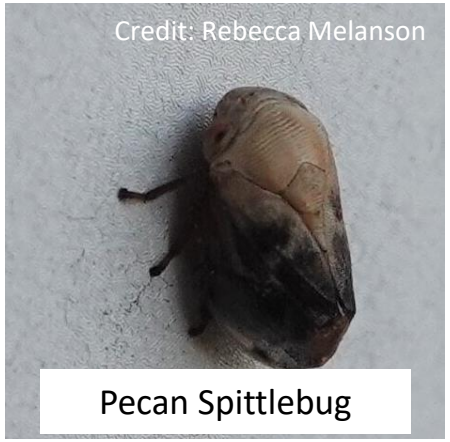
Pesticide	MOA
Abamectin	6
Bifenazate	UKN
Spirodiclofen	23
Fenpyroximate	21A
Pyridaben	21
Hexythiazox	10A

Pesticide	MOA
Etoxazole	10B
Fenazaquin	21

Sharpshooters/Spittle bugs

- Sharpshooters can transmit Xylella to pecan. This can cause bacterial leaf scorch.
- Spittle bug immatures feeding can lead to terminal dieback and nutlet drop.
- Management:
  - Neonicotinoid insecticides, preferably systemics
  - Manage weeds and alternative hosts around orchard.
  - Cultivar Selection

Glassy Winged Sharpshooter



Pecan Spittlebug

Bacterial Leaf Scorch

Broad-Headed Sharpshooter

Other Potential Foliage Pests

Sawfly

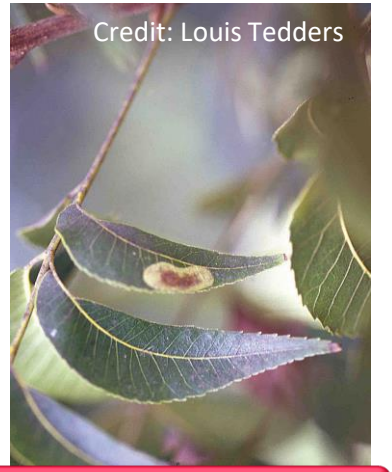
Credit: M. Merchant

May Beetle

Fall Webworm

Walnut Caterpillar

Leaf Cutter Ants



Leaf Miner

Other Potential Foliage Pests

Unicorn caterpillar

Pecan Catocala

Pecan Leaf Casebearer

Pecan Cigar Casebearer

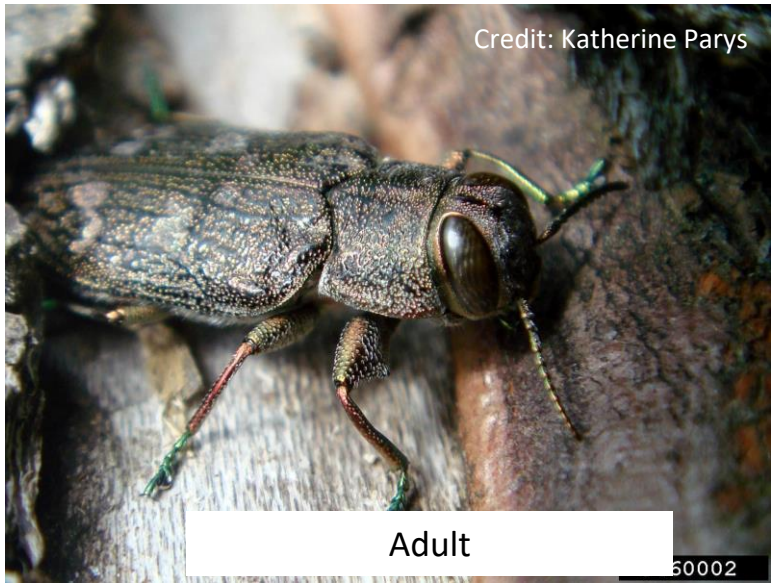
Pecan Bud Moth

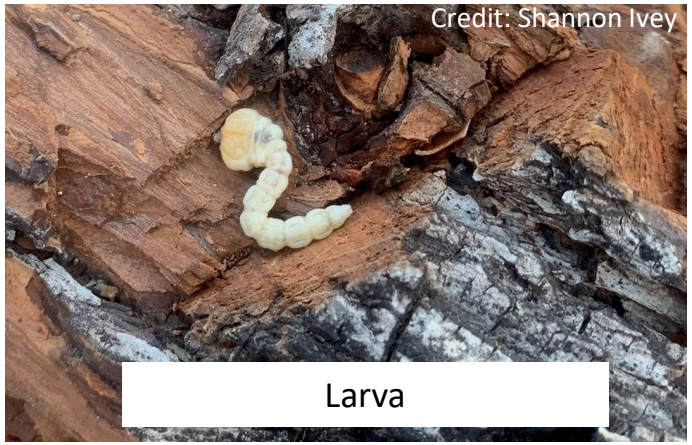
Pecan Leaf Roll Mite

Root, Trunk, and Branch Pests

Flatheaded Borers

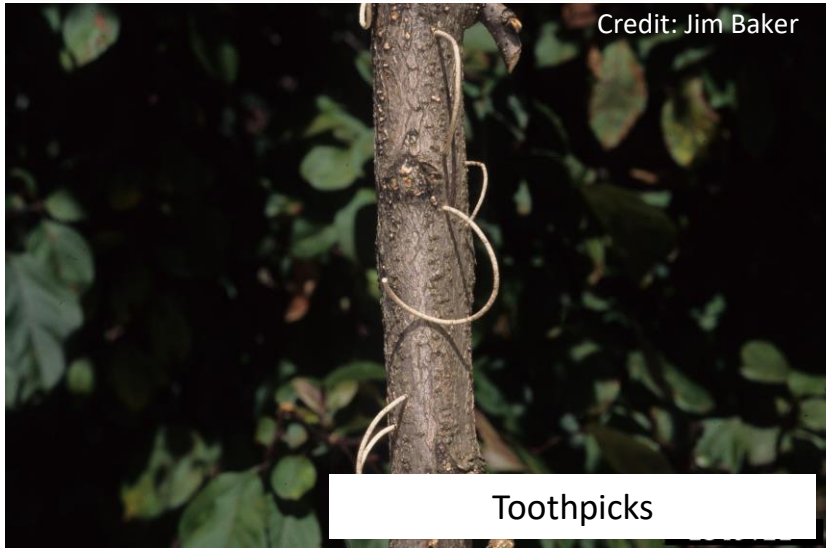
- Attack stressed trees, can girdle the trunks of young trees and can infest the branches of mature trees.
- Larva feed on the phloem (living bark), cambium, and xylem (sapwood) developing a gallery that they live in until the following year.
- Management:
  - Monitoring – Sticky Traps (Yellow, Red, Purple)
  - Maintain tree health – Good irrigation and nutrition
  - Young/Potted nursery trees – Pyrethroids spray to trunk and branches (Adults), Soil drench with Imidacloprid (Larva)
  - Mature Trees – Currently no insecticides available. However, damage is usually localized to one branch.





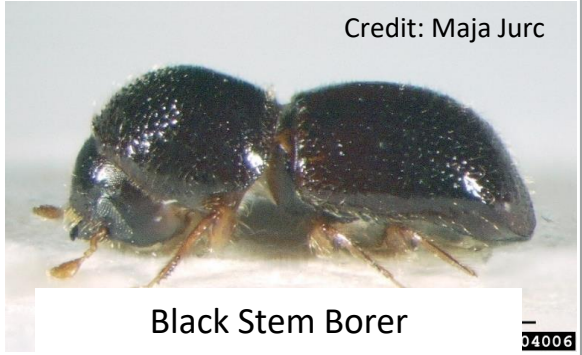
Ambrosia Beetle

- Attack young, stressed or dying pecan trees.
- Form galleries where they raise their offspring on a symbiotic fungus. Presence of ‘toothpicks’ is a sign of infestation.
- Management:
  - Monitoring – Bottle Traps, Ethanol-soaked wood bolt traps
  - Maintain Tree Health – Irrigation, nutrition, avoid planting trees in areas that flood regularly.
  - Pyrethroid can be applied to the trunk to prevent attacks, timing is difficult.
  - No current treatment once tree has been attacked.



Toothpicks

Granulate Ambrosia Beetle

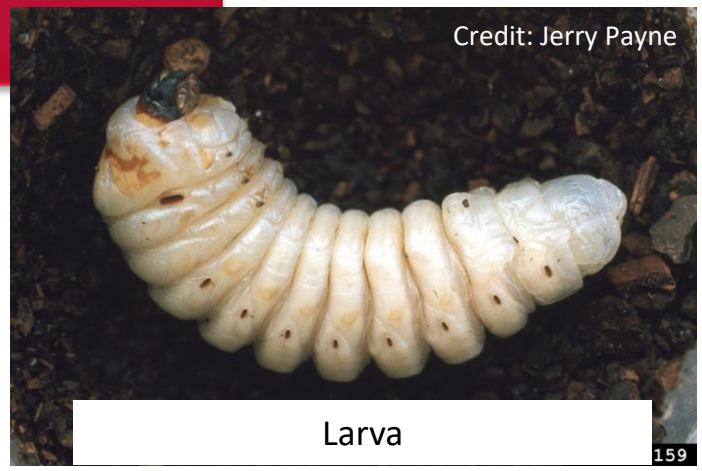


Black Stem Borer

Prionus Rootborer

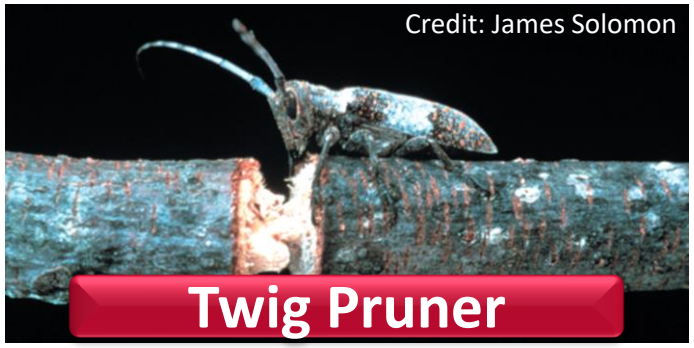
- Larvae feed on the roots eventually hollowing them out and severing them.
- Larvae will feed for 3-5 years, thus there is often a delay between infestation and symptoms of damage.
- Feeding can lead to limb death and decline of the tree.
- Management:
  - Monitoring – Pyramid Traps
  - Maintain tree health

Adult



Larva

Other Potential Root, Trunk, and Branch Pests



Twig Pruner

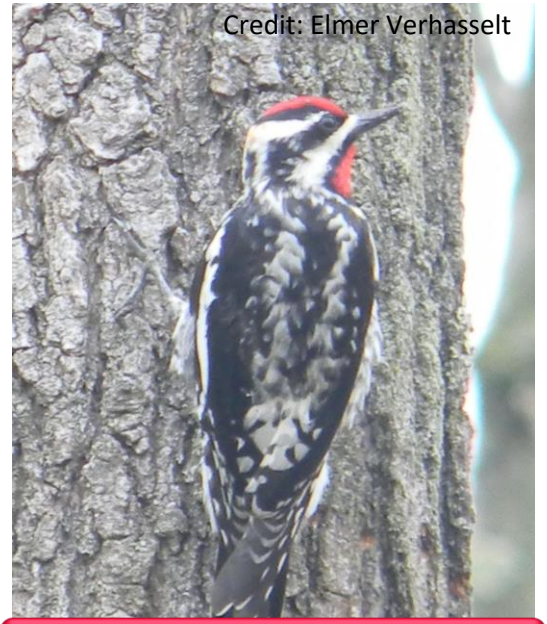
Twig Girdler

Scale

Hickory Shoot Curculio

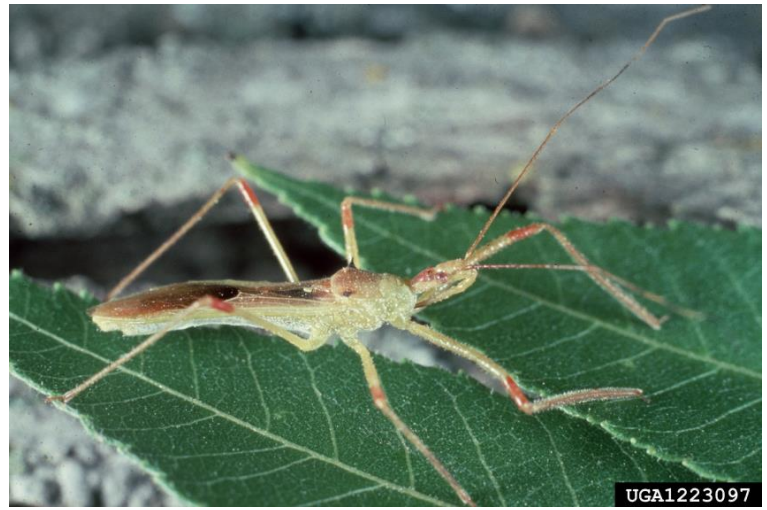
Credit: Hanna Royals

Hickory Spiral Borer



Sapsucker

Natural Enemies

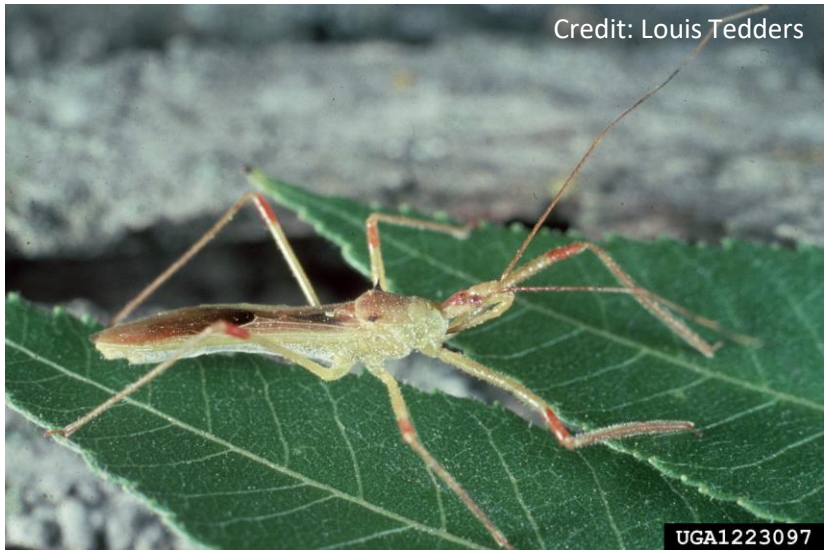


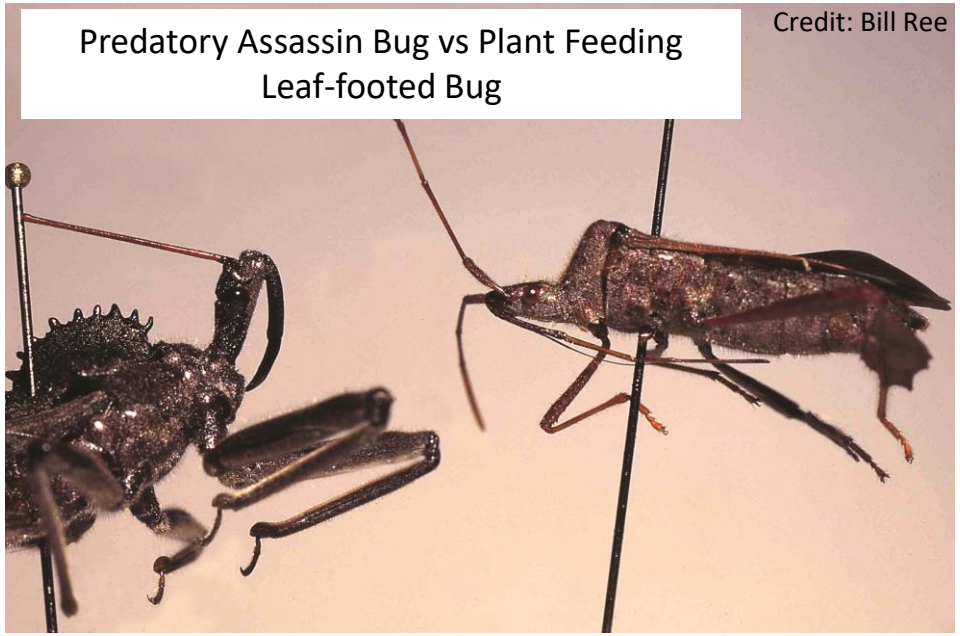
Pecan Aphid Parasitoid

- Parasitic wasp.
- Specialist parasite of the yellow aphid complex.
- Females lay eggs inside a live pecan aphid. Larva hatch out and proceed to eat and kill the aphid turning it into a mummy. The wasp will live inside the mummy as it finishes development.

Assassin Bugs

- Generalist predator, will eat both pest species such as aphids and caterpillars as well as beneficial insects such as lady beetles and spiders.





Lacewings

- Adults feed mostly on nectar, pollen, and honeydew, but adults some species will feed on aphids and other insects.
- Larva are active hunters and will feed on aphids, mites, and small caterpillars.

Green Lacewing Egg

Minute Pirate Bug

- Both adults and nymphs feed on thrips, aphids, small caterpillars, and insect eggs.

Lady Beetles

- Numerous species found in pecan orchards.
- As adults, most feed on nectar, pollen, and aphids. However, some species will feed primarily on scale insects, while multi-colored Asian lady beetle will feed a variety of prey including other beneficials such as parasitoid wasps.
- Larva are active hunters that will feed on aphids, scales, or caterpillars depending on the species.

Multicolored Asian Lady Beetle

Convergent Lady Beetle

Spotted Lady Beetle

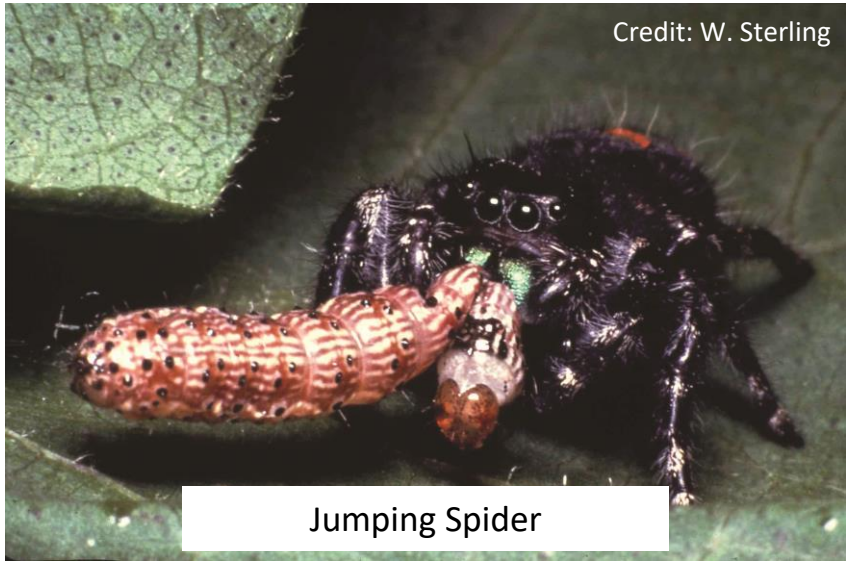
Ashy Gray Lady Beetle

Lady Beetle Larva

Spiders

- Active, generalist predators that will feed on both pest (aphids and caterpillars) and beneficial insects.

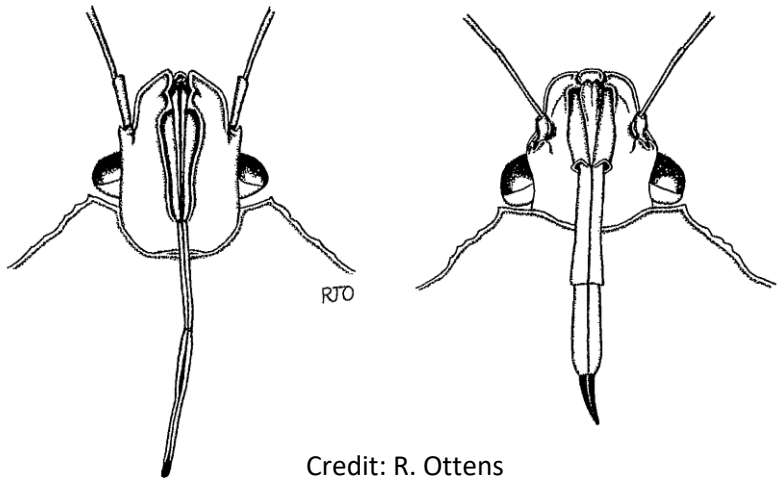
Crab Spider



Jumping Spider

Predatory Stink Bugs

- Active, generalist predators that will feed on both pest (caterpillars and sawflies) and beneficial insects.
- Can be distinguished from plant-feeding stink bugs by the beak, which is broad (twice the width of the antenna) and stout in predatory stink bugs.



Credit: R. Ottens

Credit: Debbie Roos

Credit: Hanna Royals

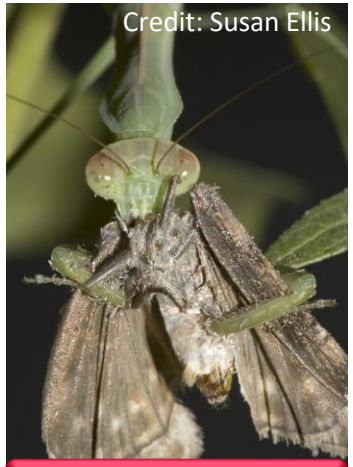
Syrphid Fly

- Syrphid fly adults feed primarily on nectar and pollen.
- Larva are predaceous and will feed on aphids.

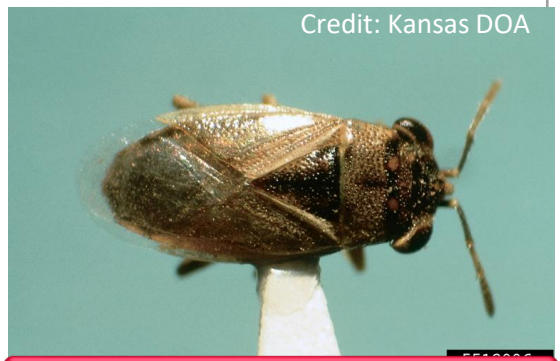
Other Potential Natural Enemies

Bats

Insectivorous Birds



Mantids



Bigeyed Bugs

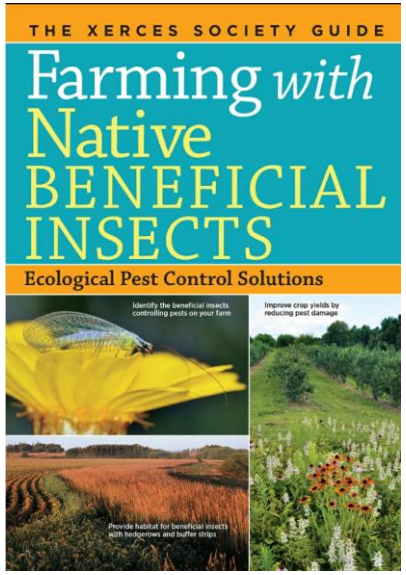
Robber Fly

Raptors

Dragonflies

Managing Beneficials

- Habitat and Overwintering sites (Cover crops, beetle banks, bat/bird houses, brush piles, insect hotels)
- Flowering resources – Alternative food supply for adults.
- Avoid broad spectrum insecticides.
- Apply pesticide responsibly.



Final Pest Management Tips

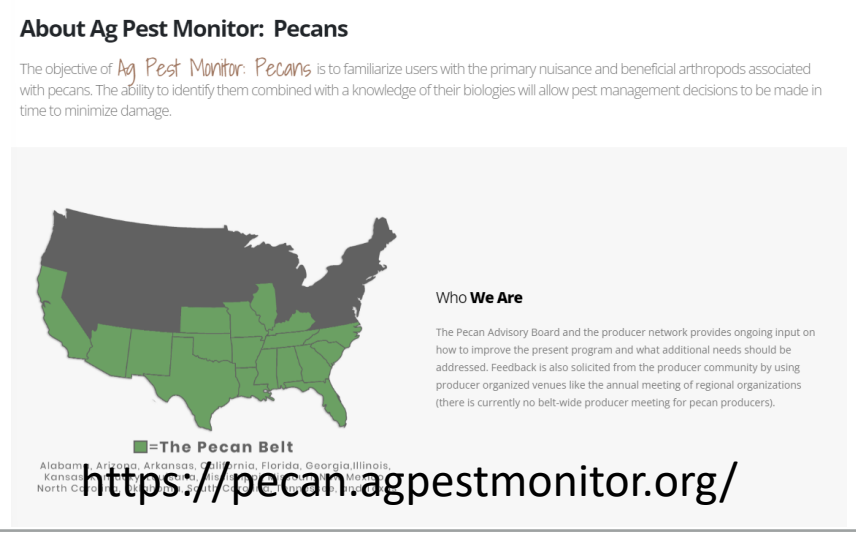
- **Hire a good scout or Get good at Scouting!!**
- **Monitor, Monitor, Monitor!**
- Understand your orchard and how it fits into the ecosystem.
- Understand the wildlife (insects, plants, birds, etc.) in your orchard.
- Read and understand your insecticide labels.

Acknowledgements

TEXAS A&M AGRILIFE EXTENSION

ESTABLISHED 1921
TEXAS PECAN
GROWERS ASSOCIATION

Visit



https://pecan.agpestmonitor.org/

MyIPM App

Sources/Further Reading

- Bill Ree. Field Guide to Insects and Mites of Pecan, B-6055: Texas AgriLife Bookstore
- Bill Ree and Allen Knutson. Managing Insect and Mite Pests of Commercial Pecans in Texas, Ento-048: Texas AgriLife Bookstore https://agrilifebookstore.org/
- Will Hudson. Insects and Mites Associated with Pecans, In: Southeastern Pecan Grower's Handbook. University of Georgia Extension. Tifton, GA.
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