Insects In Pecan

Phil Mulder, Extension Entomologist (Pecan) &
Department Head – Entomology and Plant Pathology

EXTENSION

Dormant Season

Save $ by lowering pest populations early!!!!

Obscure Scale

- Can weaken trees
- Attack pecan, hickory, oak and others
- Draws sap from tree branches
- Entire limbs may die
- Affected trees more susceptible to borers
- Weakens limbs and foliage, making foliage diseases more likely
- Can ultimately reduce pecan yields

EXTENSION

Obscure Scale

- Problem often in neglected trees.
- Inspect limbs for female scales overwintering on one- or two-year-old wood.
- Absent or present
- Populations can explode quickly
- Control initiated in winter with dormant oils
- Apply between leaf drop, but before budbreak
- Thorough coverage is the key

EXTENSION

Obscure Scale Control

- Treat all major limbs and shoots, including one-year-old shoots, coat with dormant oil solution
- Oils control scale by suffocation and by disrupting cell membranes
- Little to no residual
- Affects all stages, and mites and other overwintering insects (aphids).
- Minimal potential for resistance
- Low toxicity to humans and other mammals
- Only problem is potential phytotoxicity

EXTENSION

Dormant Oils

- VERY important to make applications when trees are in full dormancy.
- 2-4% application rate is recommended on most labels.
- Continual and strong agitation required.
- Never apply when temperatures are <33ºF. Best when temperatures are above 40ºF over a 24-hour period.

EXTENSION

Surveying for Obscure Scale

- Inspect 3 limbs on 5% of trees in December and/or January. (e.g. - 6/130 trees).
- Rate each tree 0-3 = 0 to 3 limbs with scale (present or absent). One number for each tree checked. (e.g. - 0,2,0,1,0,1)
- Orchard rating (OR) = sum of tree rating divided by the number of trees rated. (e.g. - 4/6 = .66 OR)
- Treat with oil if OR = .5 or more. (e.g. – treat)

Phylloxera

Leaf Phylloxera

Stem and Petiole Phylloxera

Galls serve as hosts for 1st generation HSW.

EXTENSION

Early Season - Phylloxera

- Survive winter as eggs in bark crevices, like aphid eggs.
- In spring, nymphs emerge after budbreak or during leaf expansion and feed on new growth.
- Nymphs secrete a substance that stimulates plant tissue to develop abnormally, creating galls.
- Galls crack open releasing winged adult phylloxera.

Phylloxera

• Feed in April on newly expanding leaf and bud growth, so this is the time to control them, not late in the season when the galls become evident. Before 2” leaf expansion.

•Can also use dormant oil sprays to reduce populations of these and scale insects. Timing for dormant oil is March before budbreak.

Pecan Phylloxera

- Beginning in April, cause galls or knots to appear on leaf veins, leaf rachises, stems, catkins, and nuts of pecan.

- An aphid-like insect, several species but primarily three of concern to growers in Oklahoma. Stem, Leaf and petiole.

- Can cause reductions in nut quality and quantity, premature defoliation, and terminal dieback. Not uncommon to find as many as 100 galls on a single terminal.

- Most susceptible varieties include; Stuart, Success, Schley, Desirable, Cape Fear and Caspiana.

EXTENSION

Early Season Control

- Insecticides (apply only if needed)
  - Must apply before gall forms
    - Lorsban, Malathion, Sevin, Silencer, Warrior, Pasada, Centric, Cobalt, Asana, Movento.
    - Apply a minimum of 100 gal./acre. Thorough coverage is imperative.

EXTENSION

Pecan Sawfly and Damage

- Generally, occurs in May after phylloxera but before casebearer time.
- Can be severe occasionally, but usually light.
- Need to use traditional insecticides, is not a caterpillar. Hymenoptera.

EXTENSION

Spring Defoliators

Catacola Larva

Catacola Adult

Adult Camouflage

Pecan spittle bug

- Generally, not a significant problem.
- Occurs in early spring about time of casebearer or slightly before.
- Controlled with traditional insecticides, not IGR's.

EXTENSION

Hickory Shoot Curculio

Adult weevil

Larva and damage to shoot

Early/Mid Season - Pecan Nut Casebearer (key pest)

PNC - life cycle

- First instar larvae overwinter in silken hibernacula attached to bud.
- Larvae tunnel into and feed on new tissue following budbreak in the spring.
- After pupation, adult males emerge about 3 days before females.
- Females begin laying eggs about 3 days after emergence.
- Eggs usually deposited on dark stigma of nutlet.
- Eggs require about 4 days to hatch.

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PNC - life cycle

- Larvae may move about for up to 2 days before tunneling into nutlets. Look for frass and webbing around base.
- First generation can destroy whole nut cluster, subsequent generations ~1-2 nuts.
- Total days from capture of first male moth to damage: 12-16 days.
- 3-4 generations per year (42-45 days apart).

OSU EXTENSION

EXTENSION

PNC - egg

PNC - early damage

PNC - late damage (2nd gen)

EXTENSION

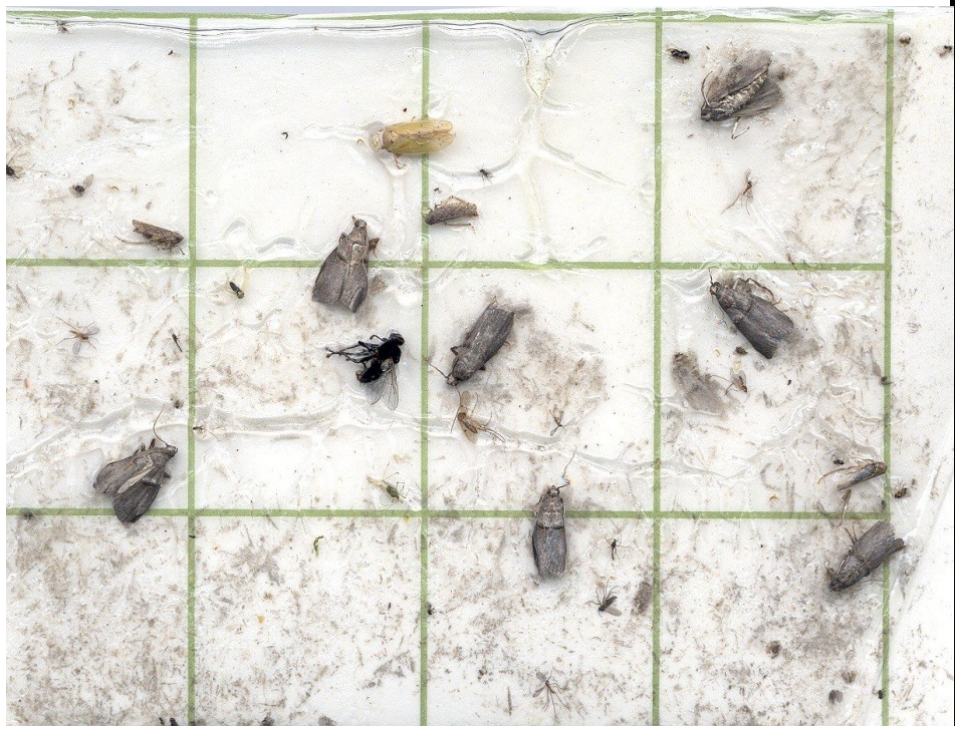
PNC - late damage (3rd gen)

PNC - larva

PNC - pheromone

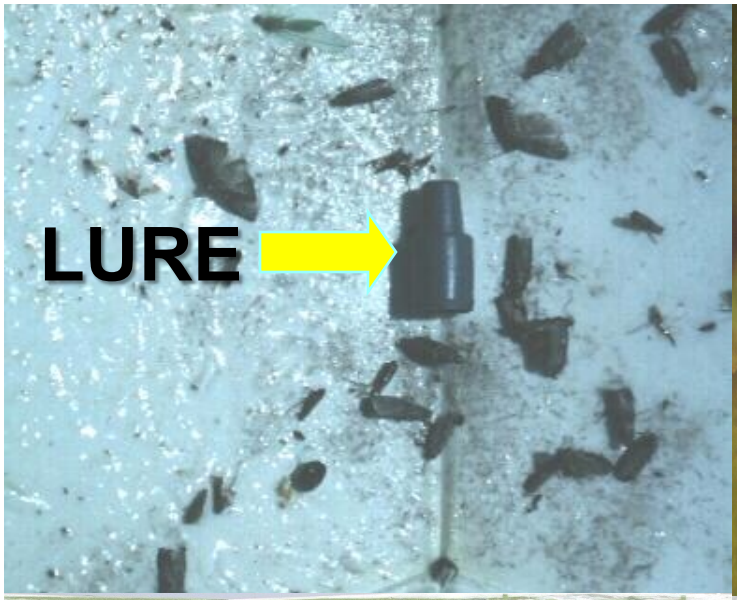
PNC - pheromone

Pecan Nut Casebearer Forecasting Network on Pecan ipm Pipe
Place PNC Traps in the orchard early May



Pheromone Application in Pecan IPM.

Detect initial moth flight to set Biofix.



Steps to generate PNC forecast

- 1) Order PNC pheromone: Trecé, Inc., Adair, Oklahoma, 918-785-3061, custserv@trece.com March 15.
- 2) Set out PNC traps May 1-10.
- 3) Monitor traps regularly – every day if possible. Once you capture moths on two consecutive dates, the moth flight has begun (biofix).

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Steps to generate PNC forecast

Example trap captures of PNC male moths for three orchards.

Based on the example, the biofix (first sustained moth capture) was determined to be May 16, May 19, and May 18 for orchards 1, 2, and 3, respectively.

	May 14	May 15	May 16	May 17	May 18	May 19	May 20	Biofix
Orchard #1	0	0	1	2	1	5	8	May 16
Orchard #2	0	0	1	0	0	3	5	May 19
Orchard #3	0	0	3	0	1	3	0	May 18

Steps to generate PNC forecast

- 4) 10 days after biofix = 10% of eggs deposited.
- 5) 13 days after biofix = 25% of eggs deposited. **Begin Scouting at this time.**
- 6) EPP 7189 “Scouting for pecan nut casebearer”
- 7) Every three days look for eggs and/or damage.
- 8) If you reach 2 infested clusters by the time you check 310 clusters then treat.
- 9) Treatment not always warranted…so scout carefully each time.
- 10) Approximately 42 days later a second generation will occur. So repeat the process.

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EXTENSION

Control

- Insecticides
  - Apply something gentle on beneficials
    - Intrepid,Confirm, Invertid, TurnStyle, Troubadour – not Intrepid Edge?
    - Organic – Entrust, Javelin, or Dipel ES (B.t.)
    - Several other choices but are not as gentle on beneficials.

All Season - Aphids

- 3 species: Overwinter in the egg stage, hatch in March. Feed on buds and young leaves until mature. Honeydew secretions support mold and mildew growth. Multiple generations/yr.
- Black-margined aphid, *Monellia caryella* - wings flat over body.
- Yellow pecan aphid, *Monelliopsis pecanis* - wings roof-like over body.
- Black pecan aphid, *Melanocallis caryaefoliae* - wings roof-like over body and dark green to black in color.

Black-margined aphid

Yellow pecan aphid

Black pecan aphid

Damage from Pecan Aphids

- Honeydew secretions can support mold and mildew growth.
- Early defoliation can affect current crop and return bloom for next year.
- Thresholds for aphids:
  - Yellow aphid complex; 20-25 aphids/compound leaf, generally underside of leaves.
  - Black aphids 1-3 aphids/compound leaf. Upper surface.

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OSU EXTENSION

Managing Aphid Infestations

- Option #1 - During weevil season incorporate an aphicide (PQZ, Carbine, Closer, Fulfill, Apta, Movento, Admire Pro, etc.) with initial weevil insecticide application(s) to control weevils and suppress aphids.

- Option #2 – Shank-in and water (thoroughly) an application of Admire Pro on both sides of susceptible trees at first signs of problem.

- Option #3 – Rely on beneficials (lady beetles, lacewings, etc.) and weather (cool, wet conditions) to eventually bring everything into harmony.

Mid/Late Season - Fall Webworm

Adult

Larva

EXTENSION

Fall Webworm

Walnut Datana or Walnut Caterpillar

No Webbing by larvae

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Fall Webworm and/or Datana Treatment ??

- Homeowner situations - Simply cut out webs, break them open for natural enemies to attack, or treat with a Bt preparation (Javelin®).
- Commercial orchards - If other problems are managed well, webworms will rarely be a problem, particularly true in the last several years because of IGR's like Confirm® or Intrepid ®.
- If using materials, later in the season, other than IGR's or Bt, use a high-pressure level to penetrate the webbing.
- Remember, webworms feed exclusively within the webbing. If caterpillars are seen outside, this means they are about to pupate or they are not webworms.

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Mid/Late Season - Hickory Shuckworm

Adult

Larva in phylloxera gall

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Hickory Shuckworm - damage

Top - Premature darkening from feeding between shuck and nut.
Bottom - Kernel feeding.

Pupal case within split shuck - overwintering state

Late Season - Stink Bugs and Leaf footed bugs

Nymphs

Nymphs

Adults

EXTENSION

Nymphal
Leaf-footed bugs
(right)

“Bad Guys”

Adult
Leaf-footed bugs
(left)

OSU EXTENSION

Adult Wheel bug (below)

Nymphal
Wheel bug
(right)

“Good Guys”

EXTENSION

Stink Bug or leaf footed bug damage

Management of true bugs in Pecan

- Populations can vary each year depending on local, nearby cropping systems.
- Can feed up until harvest, even through a hardened nut.
- Need seed heads or nuts to feed on.
- Have several native weed (thistle, golden crownsbeard, silver leaf nightshade, etc.) and other crop hosts (alfalfa, soybeans, peas, cotton, etc).
- May be important to know which true bug you are concerned about, mainly because of what they prefer to feed on.

EXTENSION

Stink bugs on Pecan

- Can continue to feed on pecans even after shuck split.

Management of true bugs in Pecan

- If problem is only occasional and light, switch to a synthetic pyrethroid during weevil season.
- If problem is chronic, late and heavy use a trap crop to monitor the bugs
- Place trap crop outside tree planting & monitor carefully for bug species.
- Trap crop types – purple hull peas, soybeans, cowpeas, pearl millet, etc. The latter is probably best in chronic, late problems because it is drought tolerant and lasts a long time with seed heads at the critical time. All species attracted to pearl millet.
- Can incorporate a pheromone and trap if brown stink bug is the main culprit.
- Peas are too determinant so 30-35 days after planting the pods are available but after that, no attraction for stink bugs and leaf-footed bugs exists.

Trap-Crop Planting in Pecan

- Pearl millet – planted about 50’ from edge of orchard allows for spraying on both sides.

Problems associated with trap cropping

- The three W's – Water, Wildlife, and Weeds.
- Trap crop needs water to grow (3 weeks after planting no water = no millet, deer love peas, and weeds (Johnsongrass) will take over even a good planting.
- With adequate rainfall or irrigation pearl millet can get 4' to 8' tall.
- Treating trap crop may be a problem for some growers but can always use an airblast sprayer.
- Can treat with several options even up to harvest time but cannot harvest the trap crop.
- Options for treatment include pyrethroids, Lorsban, etc.

Late Season - Pecan Weevil (key pest)

Pecan Weevil life cycle

- Weevils begin to emerge from soil after heavy rain (late July early August).
- Feed on nuts in water stage causing nut to abort and fall (~ .25 nuts/day/weevil).
- Nuts in gel stage are suitable for egg laying.
- Female oviposits eggs in 15-30 nuts (2-4 eggs/nut).
- Larvae feed for about 30 days, destroying kernel.
- Chew exit hole and fall to ground. Burrow into the soil 4-12 inches deep.

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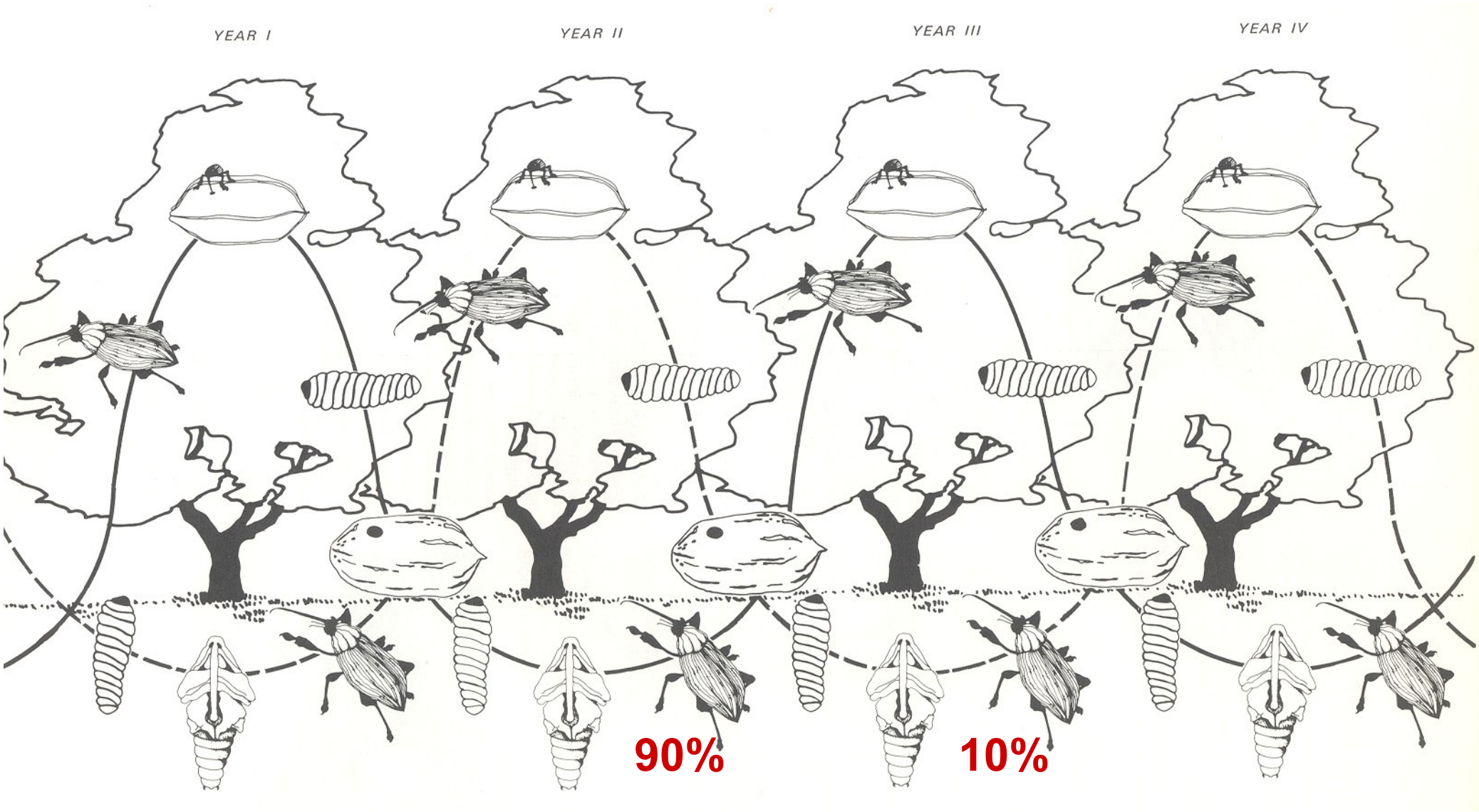
Pecan Weevil life cycle

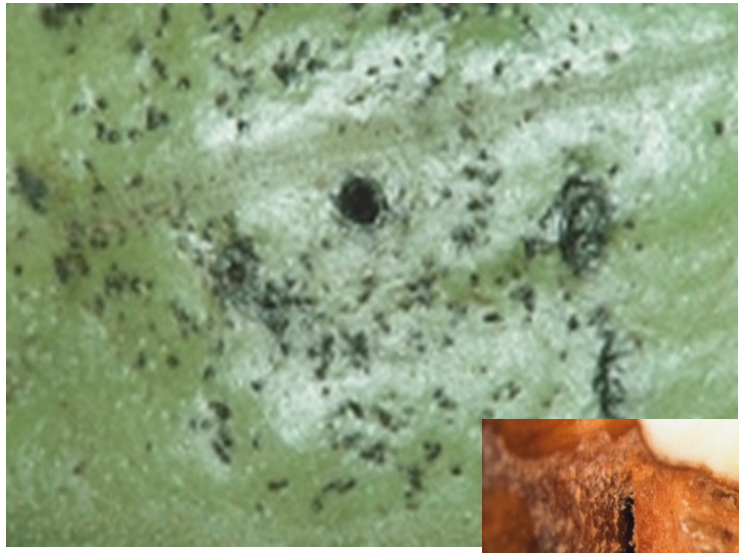


Pecan Weevil - damage

Exit hole

Larvae

Pecan Weevil - oviposition



- Nuts in late gel stage are suitable for egg laying
- Oviposits in 15-30 nuts (2-4 eggs per nut)

EXTENSION

Multiple Larvae in 1 nut

Larvae feed for about 30-42 days,
destroying the kernel

EXTENSION

Will spend 2-3 years in the soil

Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org

Larvae will pupate after one (90%) or two years (10%) in the soil, subsequently turn into adults in 2-3 weeks, then emerge the following year.

EXTENSION

Pecan Weevil Traps

12 traps under 10 trees
to assess population
ET = .5 weevil/day/trap

Simulates tree trunk
No threshhold determined

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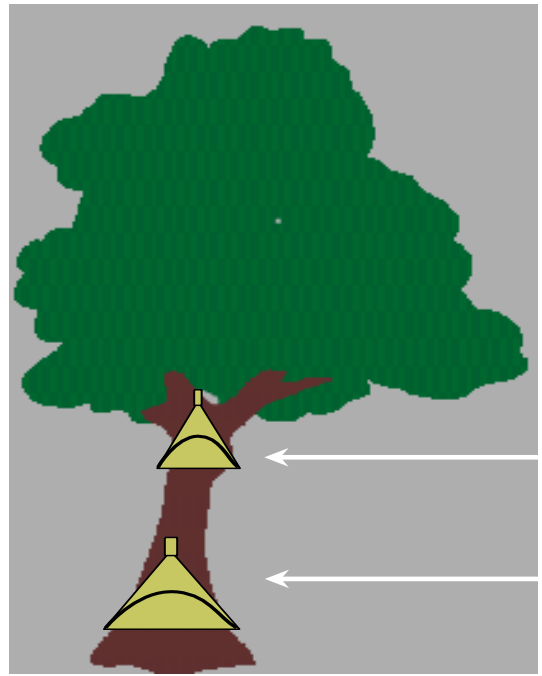
Circle Trap

- Least expensive trap type.
- Simple to build, install and monitor.
- Compatible with haying and grazing.
- Threshold of 0.3 weevils/trap on tree with 2 traps.

Pecan Weevil Movement

- About 85% of adult weevils orient to the trunk after emerging from the soil
- So, the question is, can the movement of adult weevils to the trunk be exploited for control purposes?



40% top trap

60% bottom trap

EXTENSION

Maybe????

- High weevil infestations may circumvent the possibility.
- Rate of insecticide too low for weevils to receive a lethal dose while on trunks
- Low residual activity
- Pecan weevils can fly
  - Weevil flight circumvents the trunk barrier
- May help with homeowner (few trees) situations.

EXTENSION

Circle Traps

Dynamic Treatment Threshold

- 0.3 weevils/trap/day when using 2 Circle traps on each of ten trees. Conservative. As price for pecan goes up, if control costs stay the same this threshold may decrease.
- Weevils/trap/day = total number of weevils from “X” traps after “X” number of days. Example:20 traps on 10 trees had no weevils on Monday but on Wednesday they caught 12 weevils. Therefore, divide 12 by (20x2). 12/40 = 0.3 weevils/trap/day. The number two represents the number of days since your last check of traps.
- For more information and detail on the pecan weevil and construction guidelines for the different trap types see OSU fact sheet Nos. 7079 and 7190.

EXTENSION

Control Considerations

- Treatment considerations should be based on cost/acre. Sevin XLR+ about $67.60/gallon will cost $33.80 - $84.50 (2-5 qts) per acre, depending on rate. Lambda-Cyhalothrin 1EC about $61.99 per gallon will cost $1.21 - $2.48 (2.56 – 5.12 oz) per acre.
- Weevil timing is quite variable depending on moisture. Therefore, it is best to trap on indicator trees (early varieties in sandier soils).
- Depending on management history, may take up to 4 applications in one season.

EXTENSION

Control Considerations

- Pyrethroid applications and aphid flare-ups.
  - If applying pyrethroids early (August - Early September) consider mixing with an aphicide. Objective – to keep the leaves on the tree as late as possible.
  - Remember, fruit attacked by weevil in the water stage will abort.
- Organic growers may use Grandevo WDG.
  - Very expensive (at least $30/2lbs – weevil rate is 2-3 lbs), so better be receiving a large premium. Keep in mind, that 2-4 applications may be required.

EXTENSION

“Fear No Weevil”

EXTENSION

Enough Pecans for Everyone

EXTENSION