

# Central Texas Pecan Short Course

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# Goals of IPM in Pecans

- Exceed or maintain yields equivalent to conventional
- Identify best method of pest control
- Conserve natural enemies
- Use pesticides only when necessary and at the proper time
- Minimize insecticide resistance
- Increase net profits

# An Ideal IPM Program

- Early detection of potential pests
- Assessment of pest density relative to the pest's ability to attack and cause damage
- Detect changes in density prior to next monitoring period
- Consider all pest management strategies

- Evaluate control tactics
- Calculate direct and indirect costs
- Use plan to implement IPM decisions

**“Pest management is a highly individualized and specific activity”**

# Key to Insect IPM in Pecans

- Manage around the key pests
- Treat other pests as the need arises
- Most insect management programs will require three insecticide applications
  - Pecan nut casebearer shortly after pollination
  - Hickory shuckworm at half shell hardening and again 10 to 14 days later

# Seasonal Occurrence of Pecan Pests

Feb Mar Apr May June July Aug Sept Oct Nov

## Plant Stage

D

BB

Po

WS

GS

KD

SS

LD

Phylloxera



Pecan nut  
casebearer



Pecan weevil



Hickory  
shuckworm



Honeydew aphids



Black pecan aphid



# Characteristics of New Insecticides

- Usually specific target site
- Limited pest range
- Safe to people
- Limited persistence
- Safer than pyrethroids to natural enemies
- Low use rates



# Neonicotinoids

- Mode of Action
  - Differs from nicotinoids
  - Potent interaction with insect nicotinic receptors
  - Hyper-excitation of nervous system
- Three different groups

- Chloronicotinyl
  - Imidacloprid - Bayer
    - Provado<sup>®</sup>
  - Thiacloprid - Bayer
  - Acetamiprid – Aventis
    - Assail<sup>®</sup>
- Nitromethylene

- Chlorothiazole
  - Thiamethoxam - Syngenta
    - Cruiser<sup>®</sup> - Seed treatment
    - Platinum<sup>®</sup> - Soil
    - Actara<sup>®</sup> - Foliar

# Activity of Neonicotinoids

- Primarily sucking insects
  - Homoptera - Aphids, phylloxera
    - No grazing
- Excellent oral activity
  - Limited contact
- Xylem mobile - Root uptake, plant systemic

# Macrocyclic Lactones

- Mode of action
  - Binds glutamate channel @ skeletal muscle
  - Binds GABA channel in central nervous system
  - Feeding cessation and rapid paralysis

# Activity of Macrocyclic Lactones

- Spinosad - Dow AgroSciences
  - SpinTor<sup>®</sup>
- Mode of action
  - Binds @ post-synaptic nicotinic acetylcholine receptor
  - Hyper excitation
- Good lepidopteran material
  - Grazing permitted

# Diacylhydrazine

- Mode of action
  - Non-steroidal ecdysone agonist
  - Induces premature molt in caterpillars
- Different chemistries
  - Tebufenozide – Dow AgroSciences
    - Confirm<sup>®</sup> - No grazing
  - Methoxyfenozide – Dow AgroSciences
    - Intrepid<sup>®</sup>

# Pecan nut casebearer



- Overwinters as a small larva in a cocoon called a “hibernaculum”
- Larva becomes active at budbreak
  - Tunnels into rapidly growing shoot
  - Pupates and emerges as adult



- Moth lays egg on nutlet
- Egg hatches in 4 days, feeds on tender buds 1-2 days
  - 3 to 4 generations per year



# Management of Pecan nut casebearer

- Day degree method
- Accumulate day degrees
  - Start at 50% budbreak
  - 38 ° F

- Scout at 1730 day degrees
- Sample again at 1810 day degrees
- Significant nut entry at 1831 day degrees

- Pecan nut casebearer pheromone
- Place one trap per tree
  - Traps should be 50 feet apart
  - 6-8 feet high
  - Unwrap septa saturated with pheromone and place inside trap
  - Replace pheromone every 4 weeks
- Use 3 to 5 traps per 50 acres

- Traps must be placed in the orchard early
  - Zeroes are significant
  - 4 weeks prior to spraying
- Order extra traps and pheromone
  - Can be lost in a storm
  - Pheromone will last two seasons when stored in the freezer

- Begin scouting for eggs 7-10 days after first moth capture
- **No substitutes for actual scouting**
  - Reassess applications after 5 days

# Pecan weevil

- Uncultivated situation
  - Nut production occurs every 4 to 8 years
  - Weevil exists in low numbers
  - In heavy production year, a crop is produced
    - Too many pecans for the weevil
  - Weevil starved in succeeding years

- Cultivated situation
  - Nut production occurs every 1 to 2 years
  - Weevil initially exists in low numbers
    - Poor fliers
  - Nut production is constant, so weevils continue to increase
- Weevil problems are due to good production management but poor pecan weevil management



- Female lays eggs from gel stage to shuck split
  - Feeding prior to this time causes nut to drop
  - A male damages 6 nuts in his lifetime
  - Female requires a pre-oviposition period of 5 to 6 days. A female will damage 23 nuts in her lifetime



- Larva requires 42 days to mature inside nut
  - Larva chews out of nut and drops to the ground
  - Larva can be underground in 2 to 4 minutes
  - Larva is cream colored with a reddish head
  - Remains in larval stage for 1 to 2 years

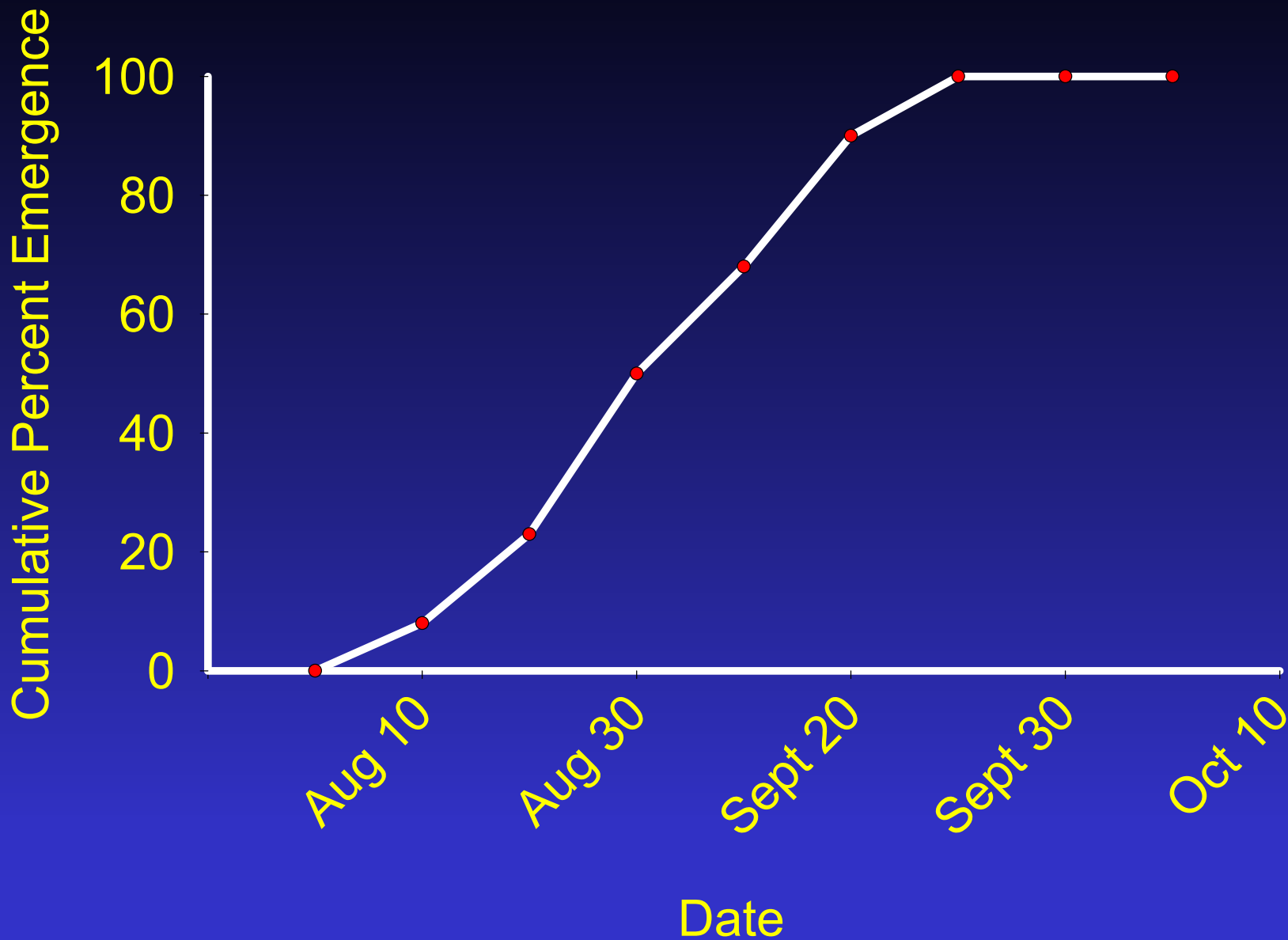
# Management of Pecan weevil

- Nut feeding prior to the gel stage is insignificant to overall problem
- Goal is to prevent egg laying
  - No insecticides can kill larva in the nut
  - No insecticides can kill larva and pupa in ground

- Treatment based on various factors
  - Monitor kernel development
  - Monitor soil hardness
  - Monitor adult emergence

- Use traps
  - Indicate weevil emergence is starting
  - Indicate emergence continues so re-treatment is necessary
  - Indicates late emergence
- Weevil emergence cones
- Tedder's trap
  - Easier to use
  - Paint tree trunks white

# Adult Pecan weevil Emergence



- Treatment regime
  - If weevils are present treat at gel stage
    - Do not assume you trapped first weevils
    - Treat immediately; Usually Aug 22-25
  - Empty traps after 4 days
    - If no emergence in next 4 days treatments can stop
    - Continue trapping until shuck split and treat if late emergence occurs

# Hickory shuckworm

- Least understood of all the pests
  - Difficult to predict
- Overwinters as nearly mature larva
  - In fallen shucks
- Larvae pupate in March
- Adults emerge about a month later





- Early in season eggs deposited on leaves
  - See some feeding in phylloxera galls
- Later generations deposit eggs on nuts

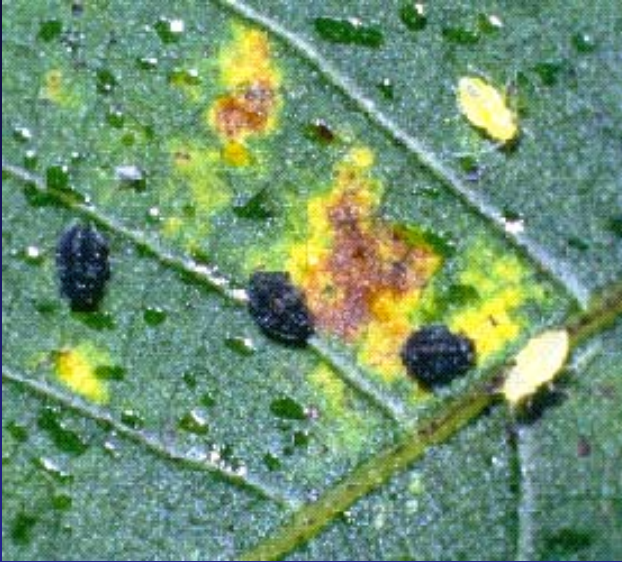
- Larvae tunnel in shuck
  - Interrupts flow of water and nutrients
  - Pupates in shuck
- Damage includes “stick tights” and poor quality

# Management of Hickory shuckworm

- Shuckworms present all season
- Increased population at time of shell hardening
  - Some evidence of delayed overwintered emergence

- Treat at half-shell hardening
  - Reapply 10 to 14 days later
  - Sanitation can help
- Watch earliest varieties in the orchard

# Aphid Complex



- Black aphid
  - Most devastating of the aphids
  - Not an early season problem
  - Protect foliage in the late season
    - Easy to control with dimethoate
    - Three aphids per compound leaf

- Honeydew aphids
  - Actually a combination of aphids
    - Black-margined aphid
    - Yellow pecan aphid
  - Cheyenne may be only tree that needs treatment
    - 25 to 30 aphids per compound leaf
    - Cure is worse than the disease
  - Resistance and resurgence problems

# Stink bug Complex



- Feed from nut set to harvest
  - Prior to shell hardening, pecans fall from tree
  - Black spots are bitter



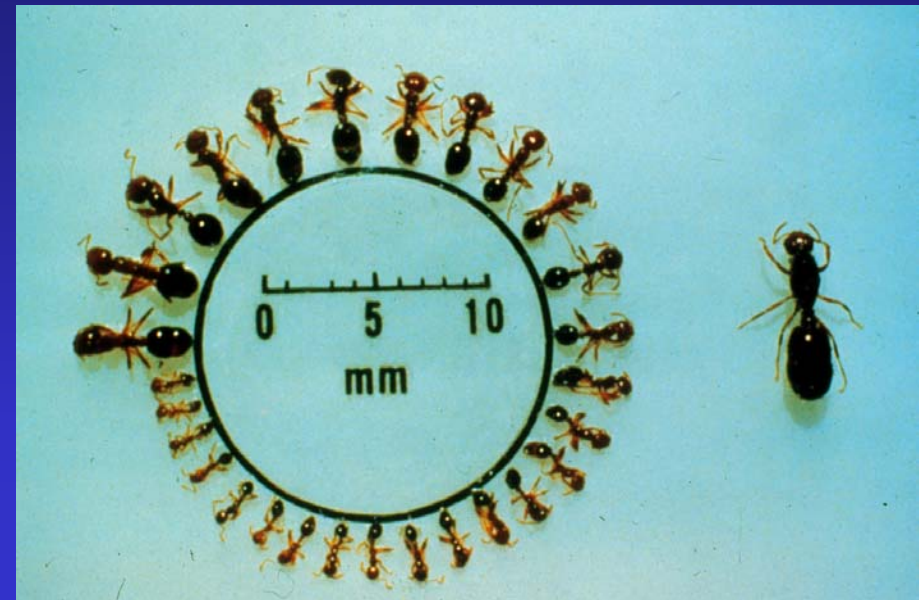
# Stink bug Management

- Control weeds in and around orchard
- Plant trap crops
  - Single row of peas
    - Black-eye, purple hull, Crowder
  - Last week in July
    - Need irrigation



# Fire ants in Pecans

- Considered a pest in pecans
  - Indiscriminate predator
  - Protect aphids
  - A pest at harvest time



# Control Options

- Eradication????
- Quarantines
- Natural and biological
- Physical and mechanical
- Organic
- Chemical

# Eradication

- Will not work
- Ants infest extensive area
  - Massive resources
- Multiple colonies
- Pesticide limitations
- Chemicals never end
- Will not work

# Quarantines

- Brown County on western edge
  - Tom Green County
- Limit movement
  - Nursery stock, turfgrass, hay and other items
- Store hay on treated pads
  - Limit soil contact

# Natural and Biological

- Weather
  - Drought and winters
- Newly mated queens attacked
  - Birds
  - Lizards
- Predators
  - *Steinernema* spp.

- Pathogens
  - *Thelohania*
  - *Beauveria bassiana*
- Parasites
  - *Solenopsis daguerri*
  - *Pseudacton* spp.
  - *Caenocholax fenyesi*
- Other ants

# Ant Competition



Big-headed ant



Red harvester ant



Carpenter ant



Little black ant

# Organic

- Citrex™
  - d-limonene
- Insecto® Formula 7
  - Pine oil
- Organics Solutions™
  - Pyrethrum



# Using Baits

- Broadcast a bait
  - Preferably twice/year
  - Spring and fall
  - Baits do not prevent re-infestation

# Tree Treatments

- Treat trunk
- Better method to preserve competitive ant species
- Products
  - Lorsban<sup>®</sup>
  - No grazing

# Advantages of Baits

- No need to find mounds
- Long-lasting control
  - 6-12 months
- Least expensive method
- Not labor intensive
- Low human toxicity
- Few environmental hazards

# Disadvantages of Baits

- Slow to work
  - Weeks to months
- 80-95% control
- Expensive
  - Low populations (<10/acre)
- Works only on active ants
- Requires spreader
- Harm non-target ants

# Bait Characteristics

Active Ingredient	Brand Name	Use Sites	Speed of Action	Duration of Control
Hydra-methylnon	Amdro	Non-bearing Graze	2-4 wks.	6-12 mos.

## Bait Characteristics (slide 2)

Active Ingredient	Brand Name	Use Site	Speed of Action	Duration of Control
Fenoxycarb	Logic	Non-bearing Graze	2-6 mos.	6-18 mos.
Pyriproxyfen	Distance Esteem	Non-bearing No graze Graze	2-4 mos.	6-18 mos.

## Bait characteristics (slide 3)

Active Ingredient	Brand Name	Use Sites	Speed of Action	Duration of Control
S-methoprene	Extinguish	Bearing Graze	2-6 mos.	6-18 mos.

# Fire Ant Mounds/Acre

