Nursery Insects

"I wouldn't do that, bartender. ... Unless, of course, you think you're fast enough."

Reference

Forest Nursery Pests

USDA Forest Service Ag Handbook 680

Nursery Insect Pests

- Leaf/foliage feeders or sap suckers
- Damage seedlings by feeding on roots, stem, shoot and buds
- Causes seedling mortality, reduces seedling grade, culls

Major Nursery Insect Pests

- White Grubs

  Phyllophaga spp.

- 100 different species and other genera of white grubs include: ***Diplotaxis, Dichelonyx, Serica, & Cotalpa***

Symptoms:

- Seedling foliage turns brown, seedling roots cut off, 3-5 mm gouges in larger roots, tap root severed, smaller roots missing.

- Appears in newly established nurseries, 2-3 yr post fumigation and in outplanting areas with sod.

- Found throughout eastern United States

Typical White Grub Larva

Scarab beetle - Adult white grub

Identification

- Grubs always "C" shaped
- Found in soil near roots
- Roots appear sparse or have chewed upon look

Identification

Adults large brown or black beetles May beetles, June bugs, Green June Beetles, Japanese beetles

Gold bug of Edgar Allen Poe

Life Cycle:

- Adults strongly attracted to lights & often found in pools of water

- Nocturnal feeders on hardwoods, especially oaks and can defoliate stands of oaks

Life cycle: 3-yr, sometimes only 2-yr in southern US

- Eggs laid in summer in soil near seedlings
- Larvae feed on roots until fall, then burrow deep in soil, hibernate in the soil.
- Spring, move back up to feed on roots
- Cycle repeated two more years,
- Larvae grow bigger each year, cause increasing damage

Life Cycle

- Larvae complete growth third spring.
- Pupate in soil for a few weeks.
- Adults emerge from pupal case but remain in soil until next spring
- Fly to oaks, feed, mate, lay eggs.

Damage

- Very injurious to seedlings
- Damage worst within a few 100 yards of *Quercus* sp
- Adults do not fly far from food to lay eggs
- 1 larva/sq ft causes serious damage

Damage

- After fumigation (or seedling establishment) damage is minimal first year
- Becomes more serious 2nd year
- Very severe third year as larvae grow larger and eat more each year
- Normally beds must be treated every 3 yr

White Grub Management

Keep adult food plants such as Quercus sp away from Nursery. Beetles are lazy and poor fliers.

Insecticides

- Fumigate beds with MBr/Chl before sowing
- Granular insecticides sometimes effective
- Dipping of seedlings in insecticide reduces damage after outplanting - high risk sites.

Pupae of parasitic (predators) wasps of white grubs

Major Nursery Insect Pests

- Lesser Cornstalk borer
  Elasmopalgus lignosellus
- Found throughout the southern US
- Larva feed upon the seedling stem; mortality, secondary pathogens enter

Lesser cornstalk borer

- Look for wounds just below to just above the ground level.
- Bark may be completely or partially removed.
- Partially girdled seedlings may have a gall/swelling on stem.
- Seedlings turn chlorotic, orange, and die; remain standing upright or tip over.

Lesser cornstalk borer

- Larva less than an inch in length
- Pale green with brown bands/stripes
- May produce silk tunnels in soil
- Wriggle furiously when handled
- Rare to find
- Adult moths, more commonly observed
- Moth-like in color, fly erratically above seedlings, about an inch across.

Lesser cornstalk borer larva

Lesser cornstalk borer adult

Lesser cornstalk borer

- Insect has 2-4 generations per year.
- Late summer, all life stages are present.
- Adult moths emerge from the soil in late spring, mate and female deposits eggs at base of seedlings.
- Eggs hatch within 7 days and larva feed on lower stem, or subterranean roots.
- Larva feed 3 wks, pupate in soil, emerge, mate lay eggs.
- Over winter as both larva and pupae in soil.

Lesser cornstalk borer

- Cover crops, sandy soils and drought favor LCB activity.

- Insect prefers corn, but it also feeds on beans, cowpeas, crabgrass, Johnson grass, peas, peanuts, sorghum, soybeans, and wheat.

- Cultivation promotes, rather than retards, injury by insect. Damage is less under no-tillage cropping systems which is attributed to increased soil moisture and the presence of decaying organic matter.

- Insecticides available to use against LCB; chlorpyrifos, carboryl, ???

Insecticides used in pine nurseries

Name	Action	"Group"	LD 50
Asana	SynP	4th Gen	2000
Pounce	SynP	3rd Gen	4000
Chlorpyrifos	OP -	Phenyl -	2000
Diazinon	OP	Phenyl -	400
Cygon	OP	Alaphatic	150*
Acephate	OP	Alaphatic	2000
Malathion	OP	Alaphatic	4000

Major Nursery Insect Pests

- Tarnish Plant Bug - *Lygus linecolaris*

- Attacks a wide variety of economically important herbaceous plants, vegetable crops, commercial flower plants, fruit trees, and nursery stock.

- Lygus bugs occur in all Canadian provinces, the continental United States and most of Mexico.

- Approximately 50% of loblolly pine seedlings in one southern forest nursery was damaged by Lygus bugs (South 1986)

Tarnish plant bug – Lygus Bug

Tarnish Plant Bug

- The insects over winters as adults in dead weeds, leaf litter, under tree bark, nursery margins, ditch banks, and road rights-of-way.

- Insects become active in early spring and feed on newly developing buds and shoots. Most nursery damage occurs from mid-April to late June.

- Oviposition is restricted to composite host plants (non-conifers) where eggs are deposited at the base of the leaf blade.

Tarnish Plant Bug

- After 7-10, yellowish-green nymphs emerge and begin feeding. The life cycle is completed in three to four weeks.

- There are two to three generations per year.

- At least 385 host plants have been recorded for *Lygus with most* in the Rosidae and Asteridae families.

- The insect also attacks pine seedlings which are severely damaged.

Tarnish Plant Bug

- Adults and nymphs of *Lygus* feed by sucking plant juices and inject into the plant a watery saliva to aid in the breakdown of plant tissues.

- The feeding causes terminal growth to be distorted thereby reducing plant growth. Damaged by *Lygus* feeding has been called "crazy cotton", "stop-back", "bush- head", "bushy-top."

- Symptoms appear within a few weeks after feeding and apical dominance is lost and weak multiple leaders appear.

Tarnish Plant Bug

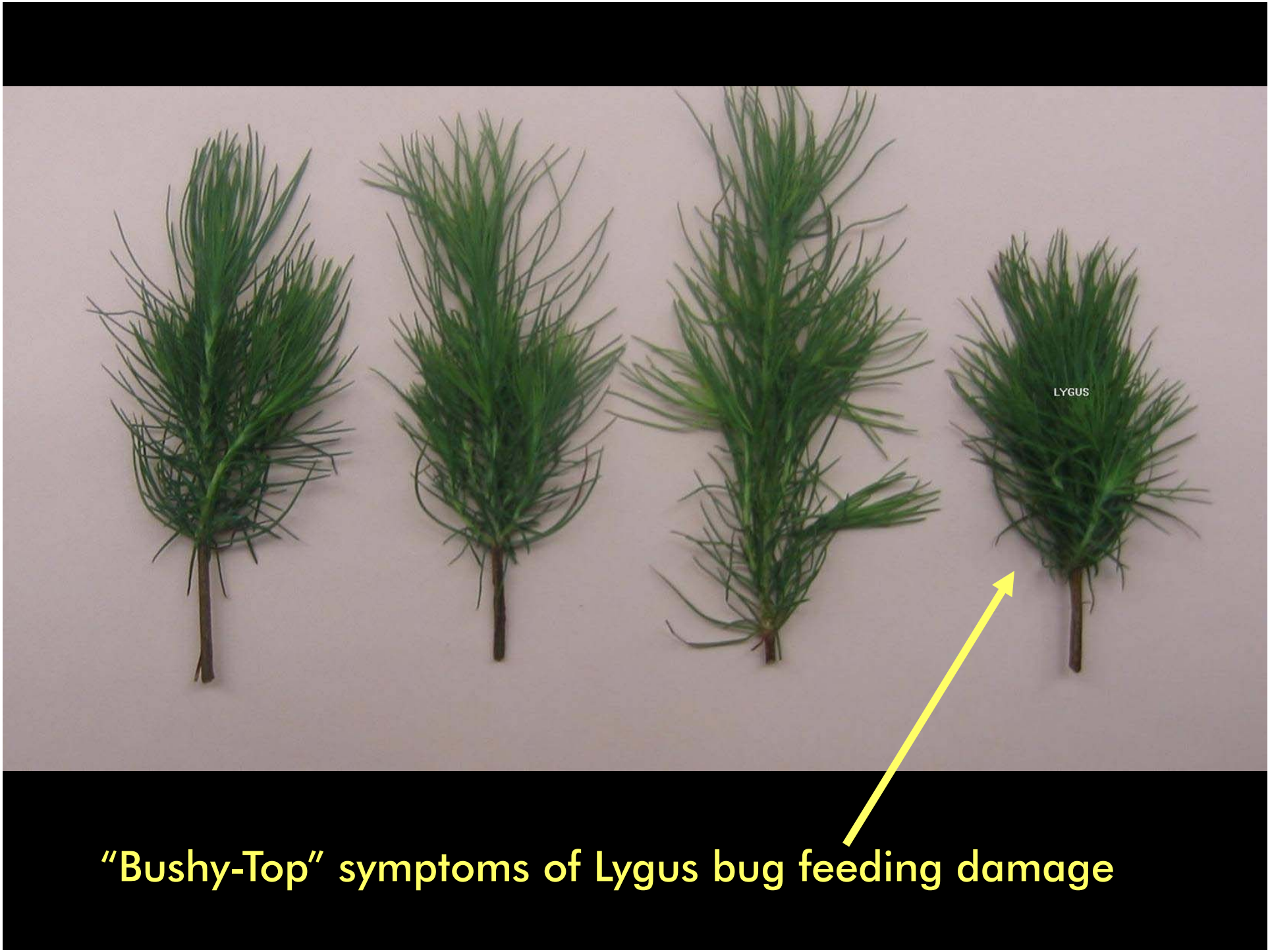
- In conifer seedlings, terminal needles are thicker and shorter and the tip is often curled

- The removal of preferred host plants from edges of nurseries and destruction of favorable overwintering sites will help to reduce the damages caused by *Lygus*. Weed hosts include butterweed, fleabane, goldenrod, vetch, dock, and dog fennel.

- Several insecticides are available to control populations of *Lygus*.

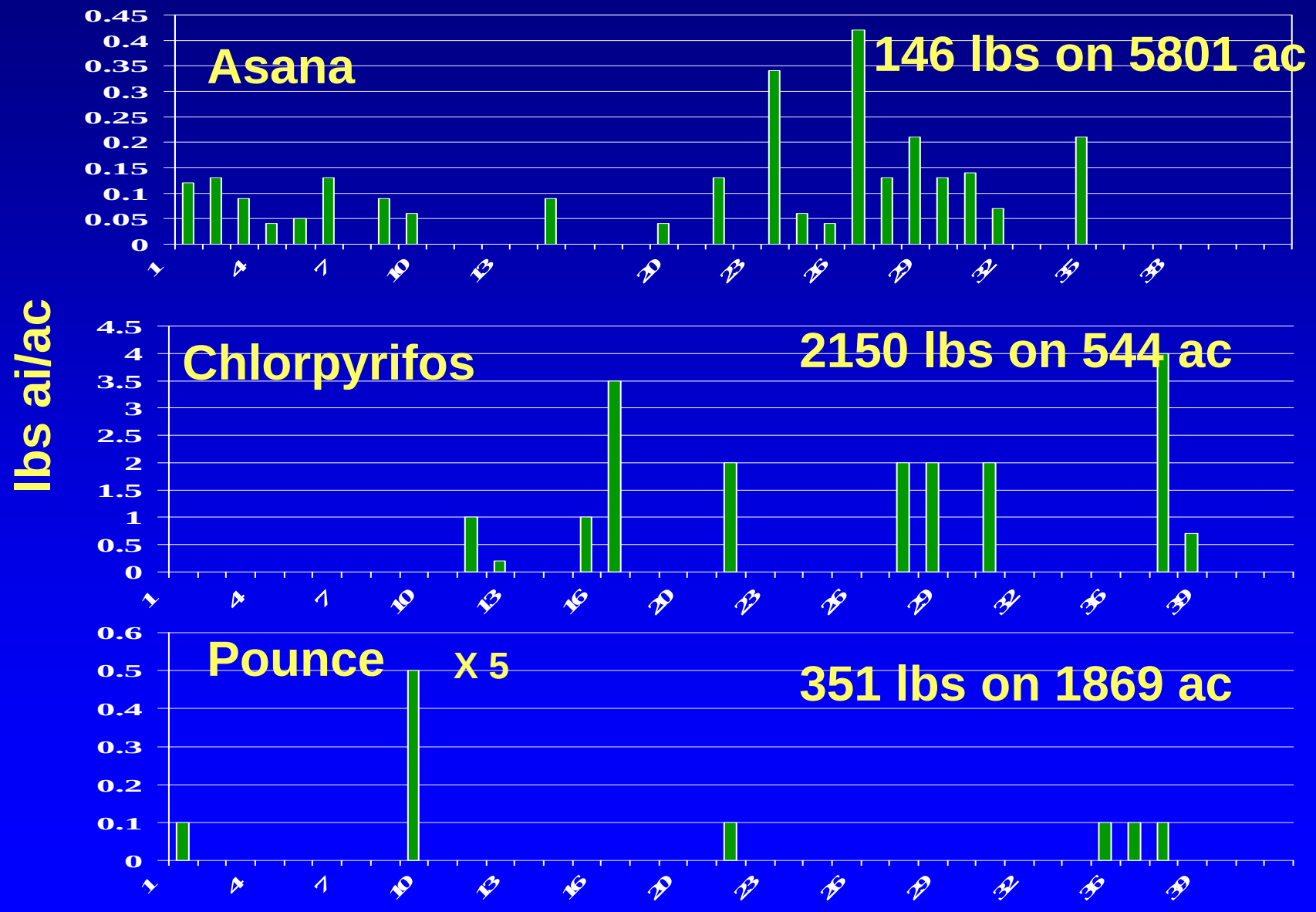
Insecticide treated bed

Non-treated bed

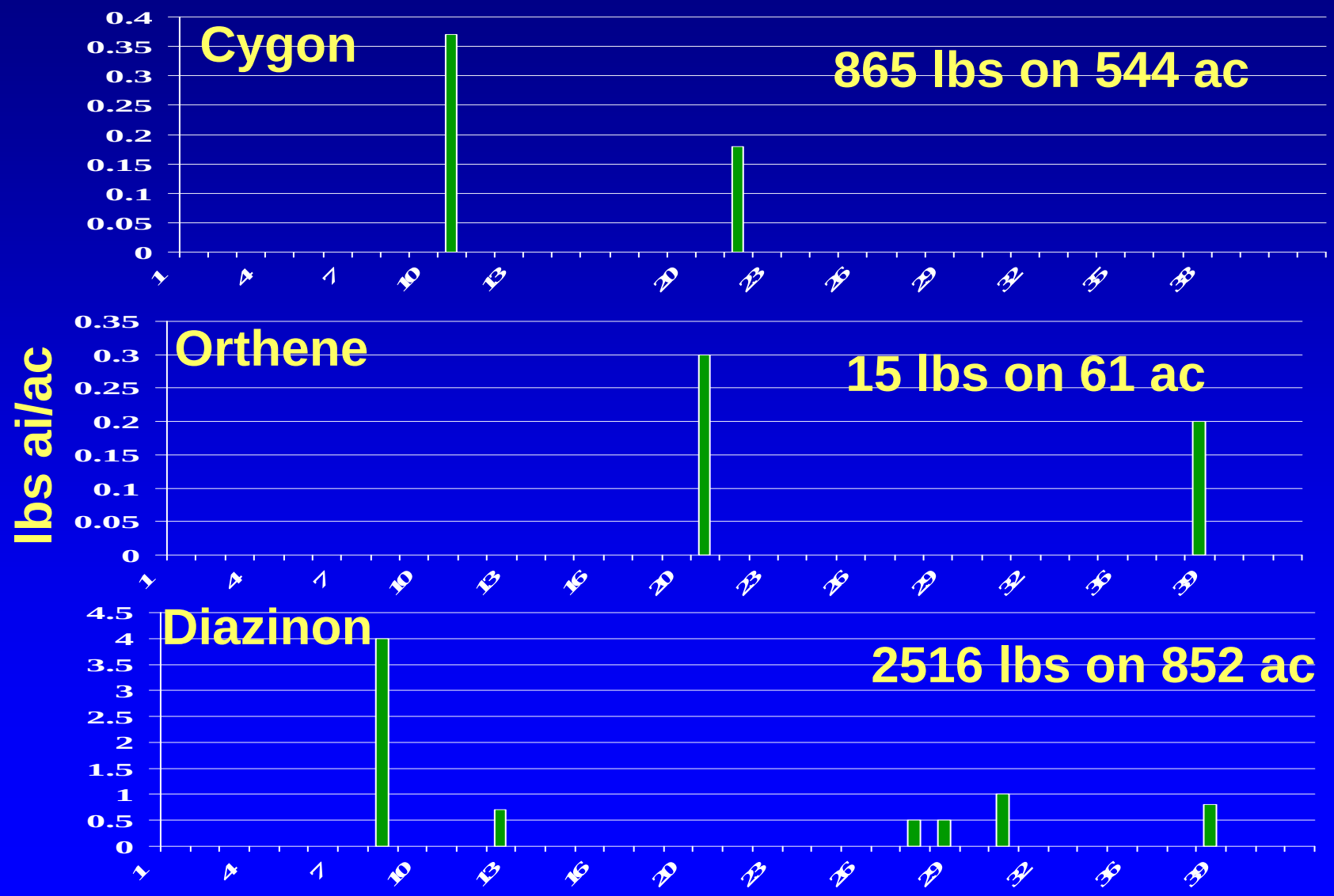


"Bushy-Top" symptoms of Lygus bug feeding damage

Lygus Control



Lygus Control - Alternatives



Mole crickets

Mole crickets:

May be important locally, but not always recognized.

Southern Pest, virtually all of Florida, the southern half of Alabama. However, recently found in Anniston. Not a problem in cold climates

Mole cricket inactive until soil reaches 60 F. Feed at night, in upper 1 inch of soil

Damage - Two types

Southern Mole cricket, Tunneling disrupts roots, uproots seedlings but does not feed on roots

Tawney mole cricket

Feeds on roots, damage can be serious.

Is common in Florida, rarer as move north.

Mole cricket damage in nursery bed

Mole cricket damage in nursery bed

Identification

Southern Mole cricket: gray with white spots, "U" shaped space between claws

Tawney Mole cricket: Tan and has "V" shaped space between claws.

Tawney Mole cricket digging leg (V shaped notch)

Biology

- Adults over-winter in deep soil burrows.
- Move up in soil profile when temperatures are right, feed.
- Adults lay eggs in soil chambers, which hatch in June.
- Pupate in soil for a few weeks.
- Two peaks of feeding activity.
- First in March/April when overwintering adults begin feeding.
- Second in Sept/Oct when the new generation of nymphs feed and the adults continue to feed.

- Second peak most damaging. There is only one generation per year

Management - Insecticides

1st peak of activity- Control optional due to low numbers. Usually when it is observed.

2nd Peak – Use Orthene, Dursban

Biological control. Parasitic wasps and nematodes available

Populations monitored/controlled using artificial cricket callers

Cutworms

Several species of Noctuidae

Distributed all over U.S. with the most damaging in Lake States and south

High populations can destroy 1000's of seedlings in a few Weeks

Damage symptoms include cut off needles and seedlings clipped at soil level

Chemical sprays and fumigation are effective
- diazinon, Chlorpyrifos

Figure 49-1—Cutworm damage on young conifer seedlings. Note clipped needles.

Figure 49-2—Dingy cutworm larva (left) and pupa.

Figure 49-3—Dingy cutworm adult.

"Regeneration" Weevils

Pales weevil
(*Hylobius pales*)

Pitch eating weevil
(*Pachylobius picivorus*)

Pales Weevil - Found throughout S.E.

Pitch eating weevil more common along Gulf Coast

Pales and Pitch eating weevils

- Most serious threat to newly planted in cut over areas.

- Attack all species of pines with 90% mortality reported. 30-60% more common.

- Difficult to separate two weevils and not necessary for practical purposes.

- Both are robust, black to reddish-brown one-half inch long. Elytra have small patches of yellow hairs

Biology

- Adults attracted to fresh resin odor and they invade recently cut over areas and eggs laid in pine stump roots.
- Eggs hatch in 5-10 days and the larvae feed on inner bark of dead roots - not a problem.
- Weevils pupate in chip cocoons and adults fly to new seedlings feed on tender bark of pine branches.
- Newly planted seedlings = girdle stem and kill
- 2 generations/yr but adults present year round in south.

Pales Weevil Damage

Pales Weevil Damage

Management

Cultural - alter replanting times

Chemical- Insecticides (Pounce)

- Prior to lifting
- At time of packing
- In the field (spot)

Planting Recommendations – Cultural

Log in Winter or Spring & Replant following Winter or Spring = Low loss of seedlings from Weevil attacks (6%)

Log in Summer Replant following Winter = Moderate loss of seedlings from Weevil attacks (20%)

Log in Fall Replant that Winter = Severe loss of seedlings from Weevil attacks (58%)

Why is timing important?

Weevils attracted to cut timber areas & lay eggs at base of stumps. They reproduce in large numbers.

Immediate replanting means you are putting the seedlings (500/acre) into a "sea" of weevils.

Waiting one year allows the insects time to disperse from the area.

Summary for Insecticides

- The use of Asana as the primary tool against Lygus is a good choice.
- The use of chlorpyrifos as the primary tool against LCB is ok but this is a poor choice for Lygus.
- Acephate should be a better choice than dimethoate as a backup for Asana.
- *** Use the 24c for Pales only as intended!!
- There is probably a better choice than Diazinon for LCB.