A FIELD GUIDE TO IDENTIFYING THE MOST COMMON FOREST PESTS OF PINE PLANTATIONS

A Production of the Alabama Forestry Commission

INTRODUCTION

You notice that several trees in a particular pine plantation are declining, dying or dead. The above ground tree symptoms are thinning, sparse crowns with yellow, chlorotic needles. The few pines that are dead have many needles that are reddish-brown. These declining and dead pines are scattered throughout the stand. What forest pest could be causing such wrath on these once assumingly healthy pines? There are several forest pests that could possibly be causing these apparent symptoms. The most common ones that generally affect southern pine plantations in Alabama that will exemplify these symptomatic tree responses are **southern pine beetle (*Dendroctonus frontalis*), Ips engraver beetle (*Ips spp.*), black turpentine beetle (*Dendroctonus terebrans*), annosus root rot (*Spiniger meineckellum*), littleleaf disease (*Phytophthora cinnamomi*), pitch canker (*Fusarium subglutinans*), needle cast (*Hypoderma spp.* and *Lophodermium spp.*), and pine decline (*Leptographium spp.*).**

Certain forest pests affect pine plantations at different stages; for instance, the previous eight pests listed generally affect older, mature trees. If these pests are present under unusual circumstances, they are quite difficult to distinguish between each other. Pine pests like the **reproduction** (**pales** and **pitch-eating**) **weevils**, **brown spot needle blight, pine tip moths** and **pine webworm** basically affect pines during their seedling and sapling stages. Still other forest pests that are quite distinguishable can affect older pines in plantations as well and they are **fusiform rust, pine sawflies**, **woolly pine scale**, **pine needle rust** and **southern pine coneworm**. Once a pine has succumbed from a primary pest, secondary pests begin to attack the tree. These secondary pests such as the flatheaded borers, roundheaded borers and ambrosia beetles are normally attracted to pines recently attacked by southern pine bark beetles. Other unconventional factors like our natural environment still have an influence on the health of pines. Abiotic factors like devastating hurricanes, strong winds, salt sprays, a prescribed burn, a persistent drought, misapplied herbicides or logging damage can have detrimental effects on pine plantations. These conditions are also pests to trees.

This guide can be used as a tool to assist forest professionals and concerned landowners alike in distinguishing the differences between these common forest pests of pine plantations. There is a step-by-step procedure with illustrations on identifying a particular forest pest to aid in the learning process.

PESTS OF YOUNG PINE PLANTATIONS

Reproduction Weevils – Pales Weevil (*Hylobius pales*), Pitch-eating Weevil (*Pachylobius picivorus*)

Host: Loblolly pine, longleaf pine, shortleaf pine, slash pine, pond pine, sand pine, spruce pine

Adult: Similar in appearance, the pales and the pitch-eating weevils are both brown to black in color with yellowish-white speckled markings. Having a long snout with tiny chewing mouthparts on a small head, the adult weevil is approximately 1/4 to 1/3 inch long. The legs are rather long compared to most pine weevils and bark beetles. The damage to pine seedlings is generally done by the adult weevil.

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Pupa and Larva: The pupa is creamy white and the size of the adult weevil. The larva is also the size of the adult weevil (1/4 to 1/3 inch long) with a white, legless body and an orange to amber colored head. The larva hatches from a small white egg that is usually laid in buried pine slash, in the roots of freshly cut pine stumps, or in severely damaged pine trees.

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Damage: The most visible symptom is the girdling of the seedling's root collar below the ground line. There may be patches of bark removed (from feeding) anywhere on the stem and branches. Buds and needles may also be damaged. The adult weevil usually feeds at night and is basically inactive during day-light hours. Because of its unique feeding habits, the damage (the symptom) done by the adult weevil is more readily noticeable than the actual weevil (the sign) itself. Since the adult weevil overwinters in the soil and duff layer, damage to the seedling is usually not done during the winter months. The two feeding peaks for adults are during the spring and early fall. Just a note, the larvae do not cause harm to the seedlings; they tend to feed on the roots of cut stumps.

Control: The most practical and least expensive method is to postpone planting of a recently harvested site for 9 to 12 months. If a pine stand is harvested before June 1, then reforestation can be done that following winter. Adult weevils are attracted to the resin flow of recently cut or severely damaged pines. Delaying reforestation will allow aging of the stump and slash, thus reducing resin flow which will make the site less attractive to weevils.

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Insecticides can be used to dip roots, spray foliage or apply to the soil at the base of the seedling. The cut stump can also be sprayed with an approved insecticide. Do not combine treatments within the same year such as dip the roots in an insecticide and apply a granular insecticide to the soil. Insecticides like Sevin or Malathion are recommended for control.

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Brown Spot Needle Blight (***Scirrhia acicola***)

Host: Mainly longleaf pine and sometimes Scotch pine but can under unusual circumstances affect slash pine, loblolly pine, white pines

Fungus: The boat-shaped spores are produced in the yellow bands on the needles from early spring to late summer. These fungal yellow lesions can develop on secondary needles at any time, but are most commonly seen from May to October. On infected longleaf pine needles, the symptom is most noticeable in August and September.

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Damage: Longleaf pines in the seedling or grass stage are most susceptible to brown spot needle blight. Infected needles will initially have grayish-green spots. These spots will soon turn to a straw-yellow color. In the later stage of infection, theses spots will become light brown with a chestnut-colored margin. Eventually, the needle tissue dies beyond and between the groups of lesions. The infected needles will finally have an overall brown appearance with a green base, a mottled middle section and a brown apex, distinctively. These dead infected needles will defoliate causing a reduction in seedling growth. Very seldom will longleaf pines succumb to brown spot needle blight unless the seedlings experience several consecutive years of infection and defoliation.

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Control: For a longleaf pine plantation, the best method is to conduct a prescribed burn, preferably in the winter. This management activity will reduce or even eliminate the fungus while encouraging the seedlings to quickly grow out of the grass stage. For ornamental longleaf pine seedlings and for Scotch pines, a fungicide (such as Bravo, Maneb or Manzate) can be used as an effective treatment.

Pine Tip Moths – Nantucket Pine Tip Moth (*Rhyacionia frustrana*)

Host: Loblolly pine, shortleaf pine, slash pine, sand pine, spruce pine, pitch pine, pond pine, Virginia pine, Scotch pine but will not attack longleaf pine or white pines

Adult: The Nantucket pine tip moth is gray with irregular patches of red, copper and gray bands on the wings. This relatively small moth approximately 1/4 inch long is rarely seen, not even during its active period from February to late fall. The moths emerge from infested branches anytime from February to March, and mate to start a new generation.

Pupa and Larva: The brown pupae are approximately 1/4 inch long (the size of the adult moth) and exist in the infested branches. These insects overwinter as pupae. The larvae, however, cause the most damage to the pines. Approximately 3/8 inch long, the worm-like larvae are yellowish-white to light brown. The larvae initially feed on new growth until they bore into the shoot for additional food.

Damage: The most recognizable damage is the browning and dying of infested shoots. A closer view will reveal resin beads and fine webbing on the branch tips. When infested shoots or buds are broken open, they will be hollow. The larvae or pupae may be observed at the bottom end of these hollowed shoots and buds, especially if the adult moths have emerged.

Control: In most cases, pine saplings do not succumb to pine tip moth attack. The main damage occurs in the stems. There is visible dieback of shoots causing deformity of the stems resulting in stunted growth of the pine. In an infested pine plantation, a control method is generally not recommended (too impractical and not economically feasible). Pine saplings are most susceptible during the first 5 years before crown closure. Once the pines are more than 5 years old and taller than 12 feet, they are not very susceptible to attack.

If a control method is recommended, the best one is to be proactive in the site preparation regime. Intensive site preparation can have a negative effect on controlling the pine tip moth's population. Excessive herbaceous weed control eliminates the habitat of its natural predators. Reducing some of the management activities associated with site preparation can sustain the predators' population, thus keeping the pine tip moth's infestation to a minimum.

Insecticides can be used to control pine tip moth. Most of the systemic insecticides for pine tip moth control are no longer available. Pounce, a contact insecticide, is still used today but timing of its application is very crucial in its effectiveness. There is a new systemic product called PTM by BASF that is currently being tested for practical use and economic feasibility. Sevin can also be used to control pine tip moth attack.

Pine Webworm (***Tetralopha robustella***)

Host: Longleaf pine, loblolly pine, slash pine, shortleaf pine, pitch pine, Virginia pine, white pines

Adult: The adult moth is smoky gray with front wings dark gray to brown at the base and tips. The wingspan is approximately 1 inch long.

Pupa and Larva: The larvae are approximately 3/4 inch long with a dark and light brown head and a light brown body with 4 darker stripes. The pupae are reddish-brown and approximately 1/2 inch long and generally exist in the soil from winter until they emerge in the spring as adults.

Damage: The most recognizable damage on pines is the large mass of brown frass and coarse pellets entangled in a silken web created by the larvae. There are usually several larvae in this silken-webbed nest. The larvae feed within the nest, clipping off pine needles. Young pine saplings around 1 to 3 years old are most susceptible, but older pines can occasionally be attacked by the pine webworm. Death of infested pines is very rare, but growth loss may occur.

Control: In a pine plantation, a control method is generally not recommended. Natural enemies such as insect parasites will increase, reducing the pine webworms' population. Hand picking the individual nests from infested pines can be an effective method. Insecticides like Sevin or Malathion can be used on high value pines.

PESTS OF PINE PLANTATIONS

Fusiform Rust (***Cronartium quercuum* f. sp. *Fusiforme***)

Host: Loblolly pine and slash pine are the most susceptible while longleaf pine is somewhat susceptible and shortleaf pine is least susceptible

Alternate Host: Oak species

Fungus: Orange-yellow blisters (spores) form on the surface of pine galls in the spring. Later during the spring season, these orange spores are produced on the undersurface of young oak leaves. By early summer, these visible orange spores produce brown, hair-like structures that will become a different spore type. This new spore type will eventually infect pines.

Damage: The symptom most noticeable on pines is the actual gall located on an infected stem or branch. On older trees, the galls can appear somewhat depressed and canker-like. The infection generally starts on a branch and eventually spreads to the main stem. Sometimes, these infected branches and stems are killed beyond the point of the galls. The presence of pitch is often associated with rust galls due to insect infestation or pitch canker infection. In early spring, orange-yellow blisters are visible on the surface of rust galls. Infected pine seedlings may succumb to fusiform rust within 2 to 3 years. Older pines with severe infections on the main stem may break at the gall site.

Control: The main control recommendation is to be proactive and plant genetically resistant pines. In a pine plantation, control is difficult. The removal of oak species in the vicinity can reduce the occurrence of fusiform rust, but this task is rather complicated. If there are just a few stem galls on a limited number of pines, then the infected stems can be pruned. For high value and ornamental pines, an approved fungicide like Bayleton can be applied to infected trees.

Pine Sawflies – Blackheaded Pine Sawfly (*Neodiprion excitans*), Redheaded Pine Sawfly (*Neodiprion lecontei*), Loblolly Pine Sawfly (*Neodiprion taedae linearis*), Slash Pine Sawfly (*Neodiprion merkeli*), Sand Pine Sawfly (*Neodiprion pratti*), Spruce Pine Sawfly (*Neodiprion warreni*), Virginia Pine Sawfly (*Neodiprion pratti pratti*)

Host: Loblolly pine, longleaf pine, pond pine, pitch pine, sand pine, shortleaf pine, slash pine, spruce pine, Virginia pine – depending on the pine sawfly species

Adult: The adult is a wasp-like or a fly-like insect. The adult emerges from a cocoon usually located in the litter layer or soil. The time of emergence depends on the particular sawfly species. The adults mate and the females lay their eggs in slits on pine needles.

Pupa and Larva: The pupae are quite similar to the adults in size and encased in a brown papery cocoon. The larvae size varies anywhere from 3/4 inch to 1 inch long having a similar appearance to a caterpillar. The larvae cause the most damage by feeding on the outermost parts of pine needles.

Redheaded Pine Sawfly

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Virginia Pine Sawfly

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Blackheaded Pine Sawfly

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Damage: There is some defoliation in the crown. Other needles may be partially or completely consumed giving a tufted-like appearance (shortened stubs on branches). Partially consumed needles will turn reddish-brown and have a straw-like presence. Colonies of sawfly larvae can be viewed on branches during certain times of the year.

Redheaded Pine Sawfly

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Blackheaded Pine Sawfly

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Loblolly Pine Sawfly

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Virginia Pine Sawfly

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Control: For a pine plantation, a control method is not usually recommended. Natural predators and climatic conditions will soon reduce the population. Trees seldom succumb to pine sawfly attacks. Insecticides such as Pounce, Sevin or Malathion can be used on ornamental pines and Christmas tree plantations.

Woolly Pine Scale (***Pseudophilippia quaintancii***)

Host: Mainly eastern white pine and Scotch pine, but can also attack loblolly pine, longleaf pine, shortleaf pine, slash pine

Adult: A very small insect, the female adult is approximately 1/16 inch long with a greenish-brown body covered with a thick layer of fleecy white wax.

Pupa and Larva: Not known to have an official pupa or larva stage, the woolly pine scale does have an egg and an immature (crawler) stage. The different immature stages are better known as instars, often referring to the last instar stage as the pupa. Because of its size, the egg and immature woolly pine scale may be difficult to see with the naked eye.

Damage: The most noticeable sign on infested pines is the masses of woolly white wax at the base of needles and on shoots. Sooty mold fungi are occasionally present, resulting in blacken needles and shoots. Woolly pine scale infestation can occur on one or on several pines. Death from this pest is rare unless it is accompanied by other stress factors. Severe attack, however, can cause branch dieback.

Photograph by Guy Jones

Control: In a pine plantation, a control method is generally not recommended. Eventually, natural predators will prey on the woolly pine scale, keeping the population at low levels. Insecticides like Sevin or Malathion can be used on high value and ornamental pines. Horticultural oils can also be applied to infested areas on the tree. Any pesticide used must be applied during the "crawler" stage, from May to July in order to have any effect on the infestation.

Photograph by Guy Jones

Pine Needle Rust (***Coleosporium spp.***)

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Host: All two and three needle southern pines

Alternate Host: Various broad-leaved plants like golden rod, aster, sunflower, morning glory

Fungus: The fungus overwinters in pine needles, emerging from the surface of these infected areas as papery white pustules in late spring or early summer. This is the time where the infection is most noticeable on pines. During the summer months, the pustules rupture and orange-yellow spores are blown to leaves of alternate hosts. By late summer, these spores appear on the leaves of these alternate hosts.

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Damage: Pine needle rust is a common disease, but generally innocuous, having very little impact on infected pines. Mainly a problem for aesthetic reasons, this fungus does not cause death to affected pines.

Control: In a pine plantation or an urban setting, a control method is generally not recommended. The removal of alternate hosts in the area of the pines can reduce the incidence of pine needle rust. For aesthetic purposes, a fungicide like Bayleton can be applied during late summer to fall on vulnerable pines as a control and preventative method.

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Southern Pine Coneworm (*Dioryctria amatella*)

Host: Loblolly pine, longleaf pine, sand pine, shortleaf pine, slash pine, spruce pine

Adult: The adult insect is a blackish-gray moth with dark grayish-brown front wings. On the front wings are white zigzag crossbands and patches. The hind wings are light grayish-brown. The wingspan of the adult moth is slightly longer than 1 inch.

Pupa and Larva: The pupa is dark brown and approximately the size of the adult moth. The larva is approximately 3/4 inch long when mature and a combination of many colors. The larva's body is a reddish-purple brown with an undersurface that is green.

Damage: The larvae do the most damage by feeding in pine cones or in the inner bark of shoots, branches, and stems. The most noticeable symptom is the large pitch mass that can exceed 1 inch in diameter on infested branches and stems. This pitch mass is similar in appearance to pitch masses created by the black turpentine beetle. This mass is milky white with some redness and pinkness color. During the pupa stage of the insect, a tan case can generally be seen protruding from a pitch mass. Since an attack is commonly adjacent to a recent bark injury or fusiform rust gall, the pitch mass may be located at that particular site on the pine.

Control: The best control method is to be proactive and avoid bark injury to trees. If southern pine coneworm infestation or fusiform rust gall infection is located on a branch, prune off that branch. For high value and ornamental pines, an insecticide such as Pounce can be applied to infested areas on the tree.

A STEP-BY-STEP PROCEDURE

TO AID IN DISTINGUISHING BETWEEN COMMON PESTS OF PINES THAT EXEMPLIFY SIMILAR SYMPTOMATIC TREE RESPONSES

PROCEDURE PREVIEW:

~ While viewing the stand in question for changes in vigor, examine an identified “unhealthy” pine

~ Take note of any unusual physical features that are visible

~ Analyze the soil type, the relative topography, the existing vegetation and the actual location (latitude) of the stand

~ Know the past and recent management activities and the approximate dates that they were completed

~ Acknowledge past and present weather conditions or any other adverse abiotic situation

~ Another helpful tool, retrieve a core sample to determine growth rate during the last few years

~ If the pest is still uncertain, cut down a symptomatic pine for closer examination

NOTES RECORDED FOR THIS PINE STAND:

~ 13-year old planted loblolly pine stand in Barbour County

~ Pine stand on sandy, well-drained soils

~ An existing drought that started in the spring of 2006

~ Notice some dead pines in January, 2007

~ Pine stand was thinned approximately 6 months earlier

~ No fungal treatment (borax) was applied to the stumps

~ Symptomatic pines have both dead and green branches

~ Tree symptoms include chlorotic to reddish-brown needles

~ No noticeable pitch tubes

~ No sign of any conks in the duff layer of the soil

~ No prominent disease circle - scattered dead pines instead

Procedure 1:

~ Do an overview of the entire cut pine

~ Take note of any unusual physical features

1. Look at the lower, mid and upper bole for past and present pest damage
2. Locate and document any signs or symptoms detected
3. Look at the crown and view the stems and branches carefully
4. Locate and document any signs or symptoms detected in these areas

This Pine Stand:

~ There are no noticeable pitch tubes in the lower, mid or upper bole

~ There are no noticeable exit holes in the lower bole

~ There are pin-sized exit holes in the upper bole

~ Needles on some branches in the upper crown are brown

~ Some of the lower branches and stems still have green needles

Procedure 2:

~ Examine more intensely the area of the tree that illustrate noticeable symptoms

~ Scrape back the bark in symptomatic areas of the tree

~ Cut a few of the symptomatic stems for closer examination

~ Start eliminating some previously suggested pests

~ Document findings

This Pine Stand:

~ Scrape back the bark on the upper bole and branches that contain the exit holes

~ Look for signs of the southern pine beetle, the Ips engraver beetle or the deodar weevil (the insect sometimes associated with pitch canker)

~ Since new needles on the lower branches are not grayish-brown, the pest is not likely to be needle cast

Procedure 3:

~ Continue to examine the tree symptoms

~ Try to identify any available signs

~ Document findings

~ Continue to eliminate previously suggested pests

This Pine Stand:

~ There are small H and Y galleries present under the bark in the area of the exit holes

~ There is a blue stain fungus present under the bark in the area of the exit holes

~ There are no bleeding or resinous cankers located on the main trunk, large branches or terminal stems

~ There is no definite dieback of the branches

~ The disease pitch canker is eliminated

Procedure 4:

~ Look at soil characteristics and topography

~ Know the management history of the stand

~ Continue to eliminate previously suggested pests

This Pine Stand:

~ The soil type is a well-drained, sandy soil

~ The stand was thinned in mid-summer, 6 months prior to this date

~ No fungal (borax) treatment was applied to the stump

~ There are no conks in the duff layer

~ Littleleaf disease is eliminated because of the sandy soil type

~ Annosus root rot is eliminated because of the date of the actual thinning

Procedure 5:

~ Examine the primary and fine feeder roots for signs

~ Look for boring and exit holes, bleeding and resinous cankers or blue stain fungus in the roots

~ Take note of the condition of the roots – decayed, deteriorated or healthy

~ Make a final conclusion on the identified pest

~ If necessary to confirm the pest identified, take root samples for analysis

This Pine Stand:

~ There are no noticeable boring or exit holes in the roots

~ There are no noticeable resin-soaked roots

~ There are no signs of blue stain fungus in the roots

~ The roots do not appear to be decayed or deteriorated

~ The disease complex pine decline is eliminated

~ Signs and Symptoms: no pitch tubes, exit holes and blue stain fungus in the upper bole, brown needles on the upper branches and apparently healthy roots

~ Final conclusion: the pest is Ips engraver beetle infestation with some damage from the deodar weevil

~ Residual pines were stressed from wind damage, recent thinning and an extended drought

FOREST PINE PEST

FACT SHEETS

SOUTHERN PINE BARK BEETLES

~ This picture illustrates the 3 main southern pine bark beetle species (Ips engraver beetle, southern pine beetle and black turpentine beetle), their gallery patterns and their general attack location on the pine tree

~ There are 3 distinct species of the Ips engraver beetle: *Ips avulsus* (small Ips or 4-spined Ips), *Ips grandicollis* (5-spined Ips) and *Ips calligraphus* (6-spined Ips)

~ The adult Ips beetle is reddish-brown to black with a scooped out, spined posterior and ranges from 1/16 to 1/4 inch long depending on the species: *Ips avulsus* is 1/16 inch long, *Ips grandicollis* is 1/8 inch long, and the *Ips calligraphus* is 1/4 inch long

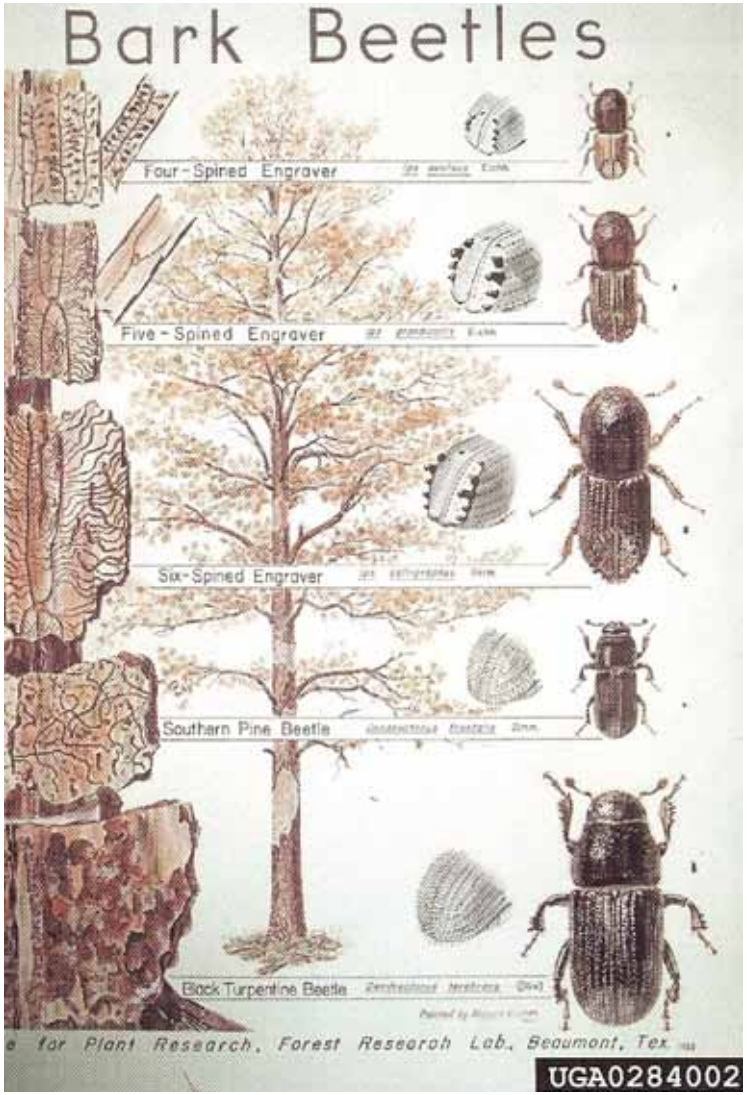
~ Depending on the species, the adult Ips beetle will attack certain areas on the pine: the 4- and 5-spined Ips will attack the upper bole while the 6-spined Ips will attack from 4 feet above ground to the upper bole, all creating Y- and H-shaped galleries

~ The southern pine beetle *(Dendroctonus frontalis)* is reddish-brown to black and approximately 1/8 inch long with a round posterior

~ The adult southern pine beetle generally attacks the tree bole from 4 to 30 feet above ground creating S-shaped galleries

~ The black turpentine beetle *(Dendroctonus terebrans)* is dark brown to black and approximately 5/16 inch long with a round posterior

~ The adult black turpentine beetle generally attacks the tree bole from ground level to 6 feet high with no gallery pattern



Painting by Richard Kleifoth Southern Forest Research Institute

Southern Pine Beetle- *Dendroctonus frontalis*

~ Attack the upper to the lower bole of the tree, approximately 4 feet above the ground

~ Loblolly and shortleaf pines are most susceptible to attack

~ Symptom: gradual foliar discoloration (from green to yellow to reddish-brown to brown)

~ Symptom: reddish boring dust in bark crevices and around the base of the pine tree

~ Symptom: whitish pitch tubes about the size of a dime in bark crevices on the bole

~ Sign: small, reddish-brown to black beetle approximately 1/8 inch long with a round posterior

~ Adult beetle will create S-shaped galleries under the bark

~ Adult beetle will vector a blue stain fungus that will cause areas on the wood to turn bluish-black

~ Symptom: a group of pines dead or dying with neighboring pines under attack

~ Mortality occurs quickly, usually 4 to 8 weeks after noticeable symptoms

Control:

~ Maintain tree vigor and health

~ Avoid mechanical injuries to residual pines

~ For a pine plantation, cut/salvage infested trees and a buffer of healthy ones to prevent spread

~ For high value and ornamental pines, spray recently infested pines with an insecticide like Onyx, Astro or Dragnet

~ As a preventative method, spray neighboring uninfested or high-risk pines with an insecticide like Onyx, Astro or Dragnet

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Ips Engraver Beetle- *Ips spp. (avulsus, grandicollis, calligraphus)*

~ Depending on the species, Ips will infest different areas in the upper bole of the tree

~ The small Ips *(avulsus)* and the 5-spined Ips *(grandicollis)* infest the very top portion of a pine

~ The larger, 6-spined Ips *(calligraphus)* will infest the lower to the upper bole on a pine

~ Southern pine species (loblolly, shortleaf, slash, etc.) under stress are susceptible to attack

~ Symptom: sudden foliar discoloration (from green to reddish-brown)

~ Symptom: reddish boring dust in bark crevices and small reddish-pink pitch tubes on bark plates

~ Sign: small, reddish-brown to black beetle approximately 1/16 to 1/4 inch long with a scooped out, spined posterior

~ May not see pitch tubes from Ips infestation during droughty conditions

~ The adult beetle will create Y-shaped and H-shaped galleries under the bark

~ The Ips beetle will vector a blue stain fungus that will cause areas on the wood to turn bluish-black

~ Symptom: tiny, pin-sized exit holes on the bole and stems of a pine

~ Mortality from Ips infestation usually exists on a few, scattered pines 4 to 6 weeks after noticeable symptoms

Control:

~ Maintain tree vigor and health

~ Avoid mechanical injury to residual pines

~ For a pine plantation, cut/salvage infested trees

~ If only a few pines are infested and the attack is not spreading, delay salvage cut for several months to allow natural predators like the clerid beetle to reduce the population

~ For high value and ornamental pines, spray recently infested pines with an insecticide like Onyx, Astro or Dragnet

~ As a preventative method, spray neighboring uninfested or high-risk pines with an insecticide like Onyx, Astro or Dragnet

Black Turpentine Beetle- *Dendroctonus terebrans*

~ Attack the lower bole of the pine, from the ground to approximately 6 feet high

~ Southern pine species (loblolly, shortleaf, slash, etc.) that are injured or stressed are susceptible to attack

~ Symptom: large pinkish-white to reddish-brown pitch tubes approximately the size of a half dollar

~ Sign: small, dark brown to black beetle approximately 5/16 inch long with a round posterior

~ Adult beetle does **NOT** create a particular gallery pattern under the bark or vector a blue stain fungus

~ An individual pine or scattered pines are generally infested with black turpentine beetles

~ Mortality usually does not occur unless the pine is heavily infested with black turpentine beetles

Control:

~ Maintain tree vigor and health

~ Avoid mechanical injuries to residual pines

~ If the number of pitch tubes is less than the diameter of the tree, spray the infested pine with an insecticide like Onyx, Astro or Dragnet 3 feet above the highest pitch tube

~ As a preventative method, spray neighboring uninfested or high-risk pines with an insecticide like Onyx, Astro or Dragnet

~ For severely infested pines, cut/salvage the pines

Annosus Root Rot- *Spiniger meineckellum (Heterobasidion annosum* or *Fomes annosus)*

~ Pines are most susceptible in sandy, well-drained soils

~ During the initial infection, no upper surface symptoms are apparent

~ After a thinning, see signs and symptoms approximately 2 to 3 years later

~ Symptoms: thin, unhealthy, chlorotic crown and wind-thrown trees

~ Sign: yellowish-brown conks with a white bottom surface in the litter layer (but not always)

~ Roots are white and stringy with some that are resin-soaked and stained

~ In the SE USA, this fungus (Basidiomycetes) usually affects a pine stand for up to 10 years

~ Pines decline/die in groups because the fungus spreads from tree to tree by root graft

Control:

~ On high hazard sites, thin pine stands during low risk summer months

~ Conduct a prescribed burn if possible to reduce the presence of the fungus

~ On high hazard sites, immediately apply the fungicide borax to freshly cut stumps

~ In severely infected stands, harvest the pines and regenerate the site after 1 to 2 years to prevent infection to seedlings

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Littleleaf Disease- *Phytophthora cinnamomi*

~ Occurs usually in heavy clayey soils that are poorly drained and low in nitrogen

~ The disease usually occurs on pines growing on low quality sites such as old fields

~ Shortleaf pine is most susceptible, following loblolly pine

~ The fungus (an Oomycetes) infects primarily small, feeder roots

~ Symptoms: thinning crowns and chlorotic needles

~ New needles in the crown of infected pines are shorter and fewer in number

~ Infected pines will produce a heavy crop of small cones usually 2 to 3 years prior to death

~ After noticeable symptoms, pine trees usually succumb to the disease from 6 to 20 years later

~ Confirmation of this disease can only be done by laboratory analysis

Control:

~ For severely infected stands, harvest pines and regenerate site with a more resistant pine species

~ For high value and ornamental pines in the early stages of the disease, commercial fertilizer and ammonium sulfate can prevent symptoms from advancing

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Pitch Canker-*Fusarium subglutinans*

~ Host pines are slash, longleaf, shortleaf and eastern white pines

~ This fungus (Deuteromycetes) will also affect sand, loblolly and Virginia pines

~ The fungus usually exists in stands where the pines are overstocked and planted off site

~ Symptom: bleeding, resinous canker on the main trunk, large branches or terminal stems

~ Symptom: shoot dieback that usually exist from the winter through the spring

~ Symptom: pitch-soaked wood beneath the canker

~ The deodar weevil can vector the fungus

~ The fungus can enter the stem through injuries from adverse weather conditions

~ Pine mortality from this fungus is rare

Control:

~ Avoid unnecessary wounds to susceptible pines

Needle Cast- *Hypoderma spp. and Lophodermium spp.*

~ Eastern white, loblolly, slash, shortleaf, Virginia and Scotch pines are susceptible as well as spruce and firs

~ Needles, usually the ones on the lower branches, are infected by the fungi in winter and early spring

~ Visual symptoms of infected needles turning yellow to red to grayish-brown generally begin in early spring

~ Fungal spores are spread to other needles during wet weather in spring and summer

~ By late spring to summer the infected needles give the pine tree a brown “fire-scorched” appearance

~ Needle cast tends to exist more so in years of heavy rainfall

~ After turning grayish-brown, some infected needles will shed

~ Mortality to pines is rare

~ Needle cast very seldom causes permanent damage, pines generally recover on their own

~ Fungicide as a control is not usually needed unless the affected hosts are commercial plantings such as Christmas tree plantations

Control:

~ For high value and ornamental pines, a fungicide like Manzate or Maneb can be periodically applied from December to June

Pine Decline- *Leptographium spp. (procerum, serpens, terebrantis)*

~ Pines growing off site with certain past management activities (like crop planting) are most susceptible

~ Adverse weather and environmental conditions (i.e. a drought) can cause pines to be susceptible

~ Loblolly and shortleaf pines are most susceptible while slash pine is least susceptible

~ Tree symptoms resemble the ones of littleleaf disease

~ Because there is no disease center, infected pines are generally scattered throughout the stand

~ Symptom: short, thin, chlorotic crown

~ Symptom: resin-soaked lesions on infected roots and some boring and exit holes in roots

~ Blue stain fungus in the primary and fine feeder roots

~ The *Hylastes* beetle and sometimes the *Hylobius pales* weevil feed on the roots and vector the fungus

~ There will be some deterioration of the roots, not necessarily root decay (fungus is a Deuteromycetes)

~ Disease usually exists with pines that are 30 years old or older, but can exist in pine trees much younger

~ Pines generally succumb to this disease complex within 2 to 3 years after showing declining symptoms

~ Confirmation of this disease complex can only be done by laboratory analysis

Control:

~ Maintain tree vigor and health

~ As a preventative method, proper timing of management activities can reduce the risk in pine plantations

~ If more than 30% of the pines in the stand are declining or dead, harvest the stand and regenerate the site with a more resistant pine species

SECONDARY PINE PESTS

Buprestidae – Flatheaded Borers (example: metallic woodborer)

Cerambycidae – Roundheaded Borers (example: southern pine sawyer)

Ambrosia Beetles – southern pine ambrosia beetle (*Platypus flavicornis)*

Termites – eastern subterranean termite (*Reticulitermes flavipes)*

OTHER PINE PLANTATION PESTS

Pine Aphids

Pine Scales

Eastern Gall Rust

(Cronartium quercuum f. sp. *Quercuum)*

Southern Cone Rust

(Cronartium strobilinum)

Pictures from the University of Georgia and the USDA Forest Service, forestryimages.org

ABIOTIC PINE PESTS

Herbicide Damage

Storm Damage

Wildfire Damage

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