



United States Department of Agriculture
US Forest Service
Natural Resource Manager (NRM)



FSVeg Common Stand Exam User Guide Seed/Cone/Flower/Fruit Insects (Category 16)

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(16-001) DOUGLAS-FIR CONE MOTH

<u>Species:</u>	<i>Ancanthocinus princeps</i>
<u>Host:</u>	Douglas-fir, grand fir, white fir, subalpine fir
<u>Range:</u>	California to Washington, Montana, Colorado
<u>Injury:</u>	Caterpillars mine through the scales and seeds, making a tortuous resinous tunnel and an opening at the surface through which resin and larval castings exude.
<u>Description:</u>	Yellowish white caterpillar. Pupae over winter near the axis of the cone in a papery, resin-coated cocoon among the resin matted scales. Adults are gray moths with a wingspread of 15 to 20 mm and with speckled forewings.

Figure 1: Adult



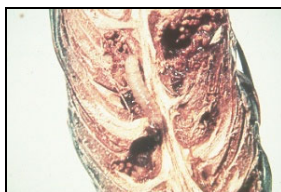
Figure 2: Egg



Figure 3: First instar larva



Figure 4: Larva in cone



(16-002) LODGEPOLE CONE MOTH

<u>Species:</u>	<i>Conophthorus contortae</i>
<u>Host:</u>	Lodgepole pine
<u>Range:</u>	California, Oregon, Washington
<u>Injury:</u>	The pinecones wither, die, and either drop to the ground or remain attached to the tree. The cones have a riddled, powdery interior and small, round exit holes. Adults bore into the base or supporting stem of the immature cone and deposit eggs. The grubs feed on the scales, seeds, and tissue of the withering cone.
<u>Description:</u>	Adults are reddish brown to black, shiny beetles 2 to 4 mm long. Larvae found within the dead cone are small, white, legless grubs.

(16-003) LIMBER PINE CONE BEETLE

<u>Species:</u>	<i>Conophthorus flexis</i>
<u>Host:</u>	Limber pine
<u>Range:</u>	Colorado, Montana, California, Southern Rocky Mountains
<u>Injury:</u>	The pinecones wither, die, and either drop to the ground or remain attached to the tree. The cones have a riddled, powdery interior and small, round exit holes. Adults bore into the base or supporting stem of the immature cone and deposit eggs. The grubs feed on the scales, seeds, and tissue of the withering cone.
<u>Description:</u>	Adults are reddish brown to black, shiny beetles 2 to 4 mm long. Larvae found within the dead cone are small, white, legless grubs.

(16-004) MOUNTAIN PINE CONE BEETLE

<u>Species:</u>	<i>Conophthorus monticolae</i>
<u>Host:</u>	Western white pine
<u>Range:</u>	Washington, Oregon, Idaho, California
<u>Injury:</u>	The pinecones wither, die, and either drop to the ground or remain attached to the tree. The cones have a riddled, powdery interior and small, round exit holes. Adults bore into the base or supporting stem of the immature cone and deposit eggs. The grubs feed on the scales, seeds, and tissue of the withering cone.

Description: Adults are reddish brown to black, shiny beetles 2 to 4 mm long.
Larvae found within the dead cone are small, white, legless grubs.

(16-005) PINE CONE BEETLE

Species: *Conophthorus ponderosae*

Host: Western white pine, ponderosa pine, Jeffery pine

Range: Washington, Oregon, California, Arizona, New Mexico

Injury: The pinecones wither, die, and either drop to the ground or remain attached to the tree. The cones have a riddled, powdery interior and small, round exit holes. Adults bore into the base or supporting stem of the immature cone and deposit eggs. The grubs feed on the scales, seeds, and tissue of the withering cone.

Description: Adults are reddish brown to black, shiny beetles 2 to 4 mm long.
Larvae found within the dead cone are small, white, legless grubs.

(16-006) MONTEREY PINE CONE BEETLE

Species: *Conophthorus radiatae*

Host: Monterey pine

Range: California

Injury: Cones are attacked by adult female beetles. The conductive tissues of the cone stalk or base are severed, killing the cone regardless of whether or not brood is produced. Dead cones are noticeable as shriveled brown cones on the tree or as partially developed cones that fall to the ground. Pitch tubes usually mark the point of adult entry into a cone stalk or cone base.

Description: Adults are 2.4 to 4 mm long, shiny dark brown to black; bodies stout and clothed with moderately long erect hairs; heads may be concealed by the pronotum; eggs ovoid, pearly white; larvae C-shaped, white, legless, with amber to light-brown heads.

(16-007) RED PINE CONE BEETLES

Species: *Conophthorus resinosae*

<u>Host:</u>	Red pine
<u>Secondary host:</u>	Jack pine
<u>Range:</u>	Northern tier of states from Maine to Minnesota
<u>Injury:</u>	Cones are attacked by adult female beetles. The conductive tissues of the cone stalk or base are severed, killing the cone regardless of whether or not brood is produced. Dead cones are noticeable as shriveled brown cones on the tree or as partially developed cones that fall to the ground. Pitch tubes usually mark the point of adult entry into a cone stalk or cone base.
<u>Description:</u>	Adults are 2.4 to 4 mm long, shiny dark brown to black; bodies stout and clothed with moderately long erect hairs; heads may be concealed by the pronotum; eggs ovoid, pearly white; larvae C-shaped, white, legless, with amber to light-brown heads.

(16-008) WHITE PINE CONE BEETLE

<u>Species:</u>	<i>Conophthorus coniperda</i>
<u>Host:</u>	Eastern white pine
<u>Range:</u>	Range of eastern white pine
<u>Injury:</u>	Cones are attacked by adult female beetles. The conductive tissues of the cone stalk or base are severed, killing the cone regardless of whether or not brood is produced. Dead cones are noticeable as shriveled brown cones on the tree or as partially developed cones that fall to the ground. Pitch tubes usually mark the point of adult entry into a cone stalk or cone base.
<u>Description:</u>	Adults are 2.4 to 4 mm long, shiny dark brown to black; bodies stout and clothed with moderately long erect hairs; heads may be concealed by the pronotum; eggs ovoid, pearly white; larvae C-shaped, white, legless, with amber to light-brown heads.

(16-009) BLACK WALNUT CURCULIO

<u>Species:</u>	<i>Conotrachelus retentus</i>
<u>Host:</u>	Black walnut
<u>Injury:</u>	Attack acorns, fruits, and nuts. The female deposits eggs in the nut. The larvae feed on the nutmeat until full grown, and then they cut exit holes through the shell.

Description: Adults are light tan to brown, or red and reddish brown to black; they are densely clothed with hairs, and range from 4.2 to 13 mm long. The beak is long and slender, and the body is scaled on the upper surface.

(16-010) DOUGLAS-FIR CONE MIDGE

Species: *Contarina oregonensis*

Hosts: Douglas-fir

Range: California, Oregon, Washington

Injury: Larvae form galls in cone scales, usually near or adjacent to seeds. A gall may be formed by a single larva but, usually, there are several in each infested scale. Seeds may be fused to the scale when only a few larvae are present or completely destroyed when numbers are large. In severe infestations, there may be hundreds of larvae in a single cone, in which case all seeds are destroyed, and scales die and turn red in July or August.

Description: Adults are 3 to 4 mm long; egg smooth, shiny white, oblong; fully developed larvae are pink to orange, about 2.8 mm long, with distinctly notched spatula; pupa orange in early stages but later turns dark, encased in oblong delicate cocoon.

Figure 5: Douglas-fir cone



Figure 6: Cross section of Douglas-fir cone



Figure 7: Cross section of Douglas-fir cone



Figure 8: Larvae in scales



(16-011) CONE SCALE MIDGE

<u>Species:</u>	<i>Contarina washingtonensis</i>
<u>Host:</u>	Douglas-fir
<u>Range:</u>	Oregon, Washington
<u>Injury:</u>	Larvae feed in cone scales, forming longitudinal mines beneath the surface of the scale under the seed wing, but they do not cause direct damage to seeds. They do not form galls. When cones are severely infested, cone scales die and turn red in late July or August. There is no external evidence of damage on cones that are lightly infested.
<u>Description:</u>	Adults are 3 to 4 mm long; egg smooth, shiny white, oblong; fully developed larvae are pink to orange (deeper orange than <i>C. oregonensis</i>), about 2.8 mm long, with distinctly notched spatula; pupa orange in early stages but later turns dark, encased in oblong delicate cocoon.

(16-012) PECAN

<u>Species:</u>	<i>Curculio</i> spp.
<u>Host:</u>	Tanoak, oak
<u>Injury:</u>	Attack acorns, fruits, and nuts. The female deposits eggs in the nut. The larvae feed on the nutmeat until full grown, and then they cut exit holes through the shell.

Description: Adults are light tan to brown, or red and reddish brown to black; they are densely clothed with hairs, and range from 4.2 to 13 mm long. The beak is long and slender, and the body is scaled on the upper surface.

(16-013) CAROLINE FRUITFLY

Species: *Dacus frauenfeldi*
Range: Pacific Islands including Hawaii

(16-014) SPRUCE BUD MIDGE

Species: *Dasineura swainei*
Host: White spruce, Sitka spruce
Range: Alaska
Injury: The attacked becomes rosette-like due to drying and recurving of the bud scales. The galls are most numerous on the sunny sides and tops of open-grown spruce, which are from 1.5 to 3 m. tall. Galls are commonly formed on the terminal buds of branches. The attacked bud is killed; elongation of lateral buds the following year causes bushy growth. When the terminal shoot is attacked, a crook develops. In some cases multiple leaders result.
Description: Full grown larvae are 1.5 to 2.2 mm long and 0.5 to 1.0 mm wide. They are pale pink with apparent segmentation. Pupae are 1.5 to 2.5 mm long and are enclosed in a delicate, transparent case. The adult is a small reddish-brown midge. The female has a reddish-brown thorax, but its abdomen and ovipositor are bright orange-red. The pale orange-pink eggs are oval shaped.

Figure 9: Larva



(16-015) FIR CONEWORMS

Species: *Dioryctria abietivorella*

Host: Douglas-fir, ponderosa pine, Shasta red fir, noble fir, grand fir, white fir, balsam fir, subalpine fir, California red fir, eastern white pine, jack pine, lodgepole pine, ponderosa pine, singleleaf pine, red pine, Scotch pine, black spruce, and white spruce

Secondary host: Western larch, limber pine, western white pine, blue spruce, and red spruce

Range: Transcontinental

Injury: Larvae mine and riddle the cones. Conspicuous frass and webbing are deposited on the cone surfaces. Twigs, graft unions of Douglas-fir and, occasionally, the cambium of young tree trunks may be infested.

Description: Adults are gray and white with a wingspan about 25 mm; fore wings smooth, blended dark and light gray with diffuse flecking; hind wings unmarked, pale gray; mature larvae about 18 mm long with deep amber-brown head and thoracic shield, amber-brown body with faint dark dorsal lines and broad pair of subdorsal stripes.

Figure 10: Frass on cone



Figure 11: Larva



Figure 12: Cone cross section



Figure 13: Moth



(16-016) SOUTHERN PINE CONEWORM

<u>Species:</u>	<i>Dioryctria amatella</i>
<u>Host:</u>	Loblolly pine, longleaf pine, shortleaf pine, slash pine
<u>Range:</u>	Virginia to Florida and westward through the Gulf States to Texas and Arkansas
<u>Injury:</u>	Larvae often bore in flowers, shoots, and cones. Frass may accumulate on infested flowers; infested shoots and green cones usually have an amorphous mass of mixed resin and frass at entry holes. External evidence of feeding immature cones, which are usually resinous, is less obvious.
<u>Description:</u>	Adult wingspan about 30 mm; fore wing ground-color dark gray-brown shaded black, marked with sharply contrasting white patches and cross bands; hind wings light grayish brown; young larvae pale with obvious dark setal bases and seven longitudinal stripes; mature larvae reddish to purplish brown above.

(16-017) PINE CONE WORM

<u>Species:</u>	<i>Dioryctria auranticella</i>
<u>Host:</u>	Knobcone pine, ponderosa pine
<u>Range:</u>	Western states
<u>Injury:</u>	One or more round holes, 4 to 7 mm in diameter, lead from the surface to large irregular cavities within a cone. The cavities are partly filled with reddish brown fecal pellets and webbing. The larvae sever many cone scales from the axis; these shrivel and turn brown. Undamaged portions of the cone may continue to grow, but the affected cones are usually badly distorted and do not open to release surviving seed.

Description: Adult has orange-brown fore wings with white cross bands; wingspan ranges from 22 to 34 mm, mature larvae blackish to light-gray body; thorax darker than abdomen, may have reddish to purplish tinge, about 26 mm long.

(16-018) LOBLOLLY PINE CONEWORM

Species: *Dioryctria merkei*

Host: Loblolly pine, longleaf pine, shortleaf pine, slash pine, Virginia pine

Injury: Early-instar larvae bore into flowers and usually leave a small amount of frass on the surface. There is usually a mass of resin and frass at the point of larval entrance to infested shoots and cones, which are irregularly tunneled.

Description: Adult wingspan 25 to 30 mm; fore wing medium brown blended with rust brown and darker shading; cross bands and lighter areas grayish; hind wings pale grayish tan; mature larvae about 25 mm long with dark tubercles and pits, body color is dark blue-black above and blue-green beneath; pupa had obtusely angled anterior spine.

(16-019) PONDEROSA TWIG MOTH

Species: *Dioryctria ponderosae*

Host: Ponderosa pine, Scotch pine, Jack pine

Range: California, Montana, Colorado, Nebraska

Injury: Most trees attacked are under 8 inches in diameter, and the bole and tops are frequently girdled by the larval tunnels. The first evidence of attack appears in the spring in the form of a small quantity of larval castings on the bark surface, followed by an exudation of pitch from the entrance holes. The larvae feed in the cambial region and construct irregularly shaped galleries beneath the bark.

Description: The adults are blackish gray moths with a wing expanse of 27 to 30 mm. There are two narrow W-shaped bands extending across each forewing; the hindwings are dusky white. Mature larvae are about 25 mm long, usually light brown, occasionally with a greenish tinge, and the bodies marked with about six rows of small, dark-brown dots, or tubercles.

(16-020) DIORCTRIA PSEUDOTSUGELLA

<u>Species:</u>	<i>Dioryctria pseudotsugella</i>
<u>Host:</u>	Douglas-fir
<u>Secondary host:</u>	True fir, spruce, hemlock
<u>Range:</u>	Washington, Oregon, Idaho, Montana, Utah, Colorado, New Mexico
<u>Injury:</u>	The larva feed in cones and mines in cambium. It has been taken from graft unions of Douglas-fir, where it may cause damage to grafted stock in seed orchards.
<u>Description:</u>	The adult wingspan is 20 to 24 mm, and resembles the spruce cone worm, but ground color is paler and transverse lines much less strongly contrasting.

(16-021) DIORYCTRIA MOTHS

<u>Species:</u>	<i>Dioryctria spp.</i>
<u>Host:</u>	Douglas-fir, true firs, pines, spruce, hemlock
<u>Range:</u>	Transcontinental
<u>Injury:</u>	Cone damage is internal, but holes and often frass are apparent on the cone surface. These insects also infest shoots, and galls.

Figure 14: Spruce cone worm larva



Figure 15: Adult (photo by John Moser)



(16-022) CONE BORERS

<u>Species:</u>	<i>Eucosma spp.</i>
<u>Host:</u>	Pine
<u>Secondary host:</u>	Douglas-fir, true firs, spruce
<u>Range:</u>	Transcontinental
<u>Injury:</u>	Larvae feed within cones on scales and seeds. External damage ranges from small, misshapen cones to cones marked only with an entrance hole surrounded by frass and pitch. Larvae may tunnel throughout the cone or may nearly hollow it out. Some species are solitary feeders. Some species may have several larvae per cone.

(16-023) SEED CHALCID

<u>Species:</u>	<i>Eurytomidae</i>
<u>Description:</u>	Typically, the adults are shining black, heavily punctured, humpbacked in profile, and sharply tapered to the rear. The larvae are legless, white, and tapered to both ends. They attack many kinds of plants. Some occur in galls caused by other insects.

(16-024) SLASH PINE FLOWER THRIPS

<u>Species:</u>	<i>Gnophothrips fuscus</i>
<u>Host:</u>	Slash pine, Austrian pine, loblolly pine, Jack pine
<u>Range:</u>	Eastern states
<u>Injury:</u>	A seed production pest on slash pine; damage to foliage of Austrian and jack pines. Feeding among the flower scales and bracts causes beads of clear resin to exude to the surface of the flower. The flowers shrivel, become encrusted with dried resin, and drop off, when feeding is severe. Less damaged flowers may survive to maturity, but because cone scales are killed, cones are often distorted owing to asymmetrical growth.
<u>Description:</u>	Adult winged or wingless, brownish black, about 2 mm long, slender body ends in tube like structure; wings, if present, consist of narrow, fleshy bars fringed with long hairs and held flat over back when at rest; immature thrips are wingless.

(16-025) CONE MAGGOT

<u>Species:</u>	<i>Hylemya anthracina</i>
<u>Host:</u>	Mountain hemlock, black spruce, Englemann spruce, Sitka spruce, white spruce
<u>Range:</u>	Western states
<u>Injury:</u>	The larvae are a vigorous feeder, constructing a spiral-feeding tunnel around the cone axis, causing considerable damage to scales and seeds. Single larvae may destroy more than half of the seeds in one cone.
<u>Description:</u>	Adults are small black flies, about 6 mm long; in general appearance resembles a house fly.

(16-026) LONGLEAF PINE SEED WORM/MOTH

<u>Species:</u>	<i>Laspeyresia ingens</i>
<u>Host:</u>	Longleaf pine, slash pine
<u>Secondary host:</u>	Loblolly pine
<u>Range:</u>	South Carolina, Georgia, Florida, Alabama, Mississippi
<u>Injury:</u>	They leave no external evidence of damage. However, when infested cones are bisected, damage to seeds can be readily observed; throughout the larval feeding period, the insects migrate from one seed to another, devouring the contents and leaving frass. Seed pairs on the same scales may become fused by silk-lined tunnels. After seed maturity, the fully developed larvae tunnel from the seeds into the cone axis.
<u>Description:</u>	Adult wingspan 10 to 20 mm; fore wings usually metallic gray with distinct silver crossbars or bands; rather flattened eggs laid in small overlapping masses; larvae 10 to 15 mm long when mature, white to cream colored; pupae 6 to 10 mm long.

(16-027) PONDEROSA PINE SEED WORM/MOTH

<u>Species:</u>	<i>Laspeyresia piperana</i>
<u>Host:</u>	Jeffery pine, ponderosa pine
<u>Range:</u>	California, Oregon, Washington, Colorado

<u>Injury:</u>	They leave no external evidence of damage. However, when infested cones are bisected, damage to seeds can be readily observed; throughout the larval feeding period, the insects migrate from one seed to another, devouring the contents and leaving frass. Seed pairs on the same scales may become fused by silk-lined tunnels. After seed maturity, the fully developed larvae tunnel from the seeds into the cone axis.
<u>Description:</u>	Adult wingspan 10 to 20 mm; fore wings usually metallic gray with distinct silver crossbars or bands; rather flattened eggs laid in small overlapping masses; larvae 10 to 15 mm long when mature, white to cream colored; pupae 6 to 10 mm long.

(16-028) SPRUCE SEED MOTH

<u>Species:</u>	<i>Laspeyresia youngana</i>
<u>Host:</u>	Black spruce, blue spruce, Englemann spruce, red spruce, Sitka spruce, white spruce
<u>Range:</u>	Alaska, Washington, Oregon, Montana, Colorado
<u>Injury:</u>	They leave no external evidence of damage. However, when infested cones are bisected, damage to seeds can be readily observed; throughout the larval feeding period, the insects migrate from one seed to another, devouring the contents and leaving frass. Seed pairs on the same scales may become fused by silk-lined tunnels. After seed maturity, the fully developed larvae tunnel from the seeds into the cone axis.
<u>Description:</u>	Adult wingspan 10 to 20 mm; fore wings usually metallic gray with distinct silver crossbars or bands; rather flattened eggs laid in small overlapping masses; larvae 10 to 15 mm long when mature, white to cream colored; pupae 6 to 10 mm long.

(16-029) BOXELDER BUG

<u>Species:</u>	<i>Leptocoris trivittatus</i>
<u>Host:</u>	Boxelder
<u>Secondary host:</u>	Maple, ash
<u>Range:</u>	Eastern states
<u>Injury:</u>	It will eat the seeds, but it is not considered a major pest.

Description: Adult is about 12 mm long and brownish black with narrow red lines on the upper surface. The abdomen under the wings is bright red.

(16-030) LEAFFOOTED PINESEED BUG

Species: *Leptoglossus corculus*

Host: Longleaf pine, slash pine

Secondary host: Eastern white pine, loblolly pine, pitch pine, pond pine, shortleaf pine, spruce, Virginia pine

Range: Northern Florida

Injury: The seed bug causes two types of damage. Second-instar nymphs feed on ovules in conelets, frequently destroying the ovules and causing conelet abortion. Later instars and adults feed on seeds. These seeds appear to be undeveloped, collapsed or hollow, or they may retain residues of tissue, depending on the extent of seed coat development at the time feeding occurs. Discoloration of the seed coat may occur around the minute feeding holes, but these are difficult to detect.

Description: Adults are elongate, about 19 mm long, with an obviously elongated, narrow head; body reddish brown marked with black and with dense creamy pubescence; wings brown with narrow zigzag whitish cross bands; head black with three obvious dorsal yellowish to reddish brown longitudinal stripes; hind tibia or "leaf," with white blotch, together with smaller scattered white spots.

(16-031) WESTERN CONIFER SEED BUG

Species: *Leptoglossus occidentalis*

Host: Douglas-fir, grand fir, incense cedar, Jeffrey pine, knobcone pine, lodgepole pine, Monterey pine, ponderosa pine, limber pine, Austrian pine, western white pine

Range: Washington to California, and Colorado to the Pacific coast

Injury: Insect pierces cone scales and feeds upon developing seeds. Entire contents of seed may be removed. Cones may develop normally, but produce no viable seed.

Description: Adults are robust, elongate, 15 to 18 mm long, 4 to 6 mm wide, with long legs and antennae; body surface reddish to dark gray with dense whitish pubescence; fore wing marked by distinctive narrow zigzag white line.

Figure 16: Cones



Figure 17: Adult



(16-032) HOLLYHOCK THRIPS

<u>Species:</u>	<i>Liothrips varicornis</i>
<u>Range:</u>	Pacific islands including Hawaii

(16-033) MEGASTIGMUS LASIOCARPAE

<u>Species:</u>	<i>Megastigmus lasiocarpae</i>
<u>Host:</u>	Pacific silver fir, subalpine fir
<u>Range:</u>	Washington and Colorado
<u>Injury:</u>	The contents of the seed are consumed by the larvae.
<u>Description:</u>	Adults are black and yellow and occur in Colorado and Washington.

(16-034) SPRUCE SEED CHALCID

<u>Species:</u>	<i>Megastigmus piceae</i>
<u>Host:</u>	Englemann spruce, white spruce, blue spruce, Sitka spruce
<u>Range:</u>	California, Oregon, Alaska, Montana, Colorado, New Mexico

Injury: The contents of the seed are completely consumed by the larvae.

Description: Adults are yellowish brown, 6 to 6.5 mm long, with clear wings; female has a black ovipositor, 4.5 mm long; males slightly smaller than females.

(16-035) PONDEROSA PINE SEED CHALCID

Species: *Megastigmus albifrons*

Host: Ponderosa pine

Range: California, Oregon, New Mexico

Injury: The contents of the seed are completely consumed by the larvae.

Description: Adults are yellowish brown, 6 to 6.5 mm long, with clear wings; female has a black ovipositor, 4.5 mm long; males slightly smaller than females.

(16-036) FIR SEED CHALCID

Species: *Megastigmus pinus*

Host: Bristlecone fir, grand fir, noble fir, Pacific silver fir, Shasta red fir, subalpine fir, California red fir, white fir

Range: California, Oregon, Washington, Nevada, Colorado, Idaho

Injury: Each larva consumes the contents of a single seed, leaving no external evidence of damage. Infested seeds are about the same weight as normal seeds. A clean round hole is cut in the seed coat by the emerging adult.

Description: Adults are black with yellow markings, female about 5.1 mm long.

(16-037) DOUGLAS-FIR SEED CHALCID

Species: *Megastigmus spermatrophs*

Host: Douglas-fir, bigcone Douglas-fir

Range: Western states

Injury: Infested seeds are identical to normal seeds in color and size and show no external evidence of damage. A clean round hole is cut in the seed coat by the emerging adult.

Description: Adults are 3.4 mm long, body yellow, reddish eyes. There will be maggot-like larvae inside seeds, about 2 mm long and creamy white.

Figure 18: Adult on cone



Figure 19: Larvae in seeds



Figure 20: Larvae in seed



Figure 21: Exit holes in seeds



(16-038) YELLOW POPLAR WEEVIL

<u>Species:</u>	<i>Odontopus calceatus</i>
<u>Host:</u>	Magnolia
<u>Range:</u>	New England to Florida and west to Michigan, Iowa, and Missouri
<u>Injury:</u>	Adults feed on expanding buds in April and May and later feed on the leaves, making rice-shaped holes. Eggs are deposited in the midribs of the undersides of leaves during May and early June. The larvae mine the leaves and later pupate within the mines. The adults then emerge and feed on the leaves until about mid-July, when they enter the duff and hibernate until the following spring.

(16-039) FRUITPIERCING MOTH

<u>Species:</u>	<i>Othreis fullonia</i>
<u>Host:</u>	Citrus, guava, mango, papaya, pomegranate, coral trees
<u>Range:</u>	Pacific Islands including Hawaii and Guam
<u>Injury:</u>	A round, pinhole-sized puncture is made in fruits. The hole serves as an entry point for disease organisms and can result in early fruit drop. A small cavity is left in the fruit in the feeding site. The fruit around the cavity will be dry and spongy.
<u>Description:</u>	Eggs are laid on coral trees. The caterpillars feed on the coral tree leaves. Large populations of moths occur periodically following droughts.

(16-040) ROUNDHEADED CONE BORER

<u>Species:</u>	<i>Paratimia conicola</i>
<u>Host:</u>	Knobcone pine, lodgepole pine
<u>Range:</u>	California, southern Oregon
<u>Injury:</u>	Larvae bore through the woody axis and scales of the cones and cause damage to the seeds. They also work in the dry limbs.
<u>Description:</u>	Adults are slender, cylindrical, rusty brown beetles 8 to 13 mm long.

(16-041) MANGO SHOOT CATERPILLAR

Species: *Penicillaria jocosatrix*

Host: Mango, cashew

Range: Pacific Islands including Hawaii and Guam

Injury: The larvae consume the new leaves, tender shoots, flowers, and occasionally fruits of mango. On Guam, new growth may be completely defoliated. Caterpillar feeding can seriously retard the growth of trees and prevent or reduce flowering. Consumption of flowers can prevent fruit production on trees, which do not flower.

Description: Eggs are laid singly near new growth on twig, bud scales, new leaves, and old leaves. Initially eggs are green, but turn brown on the second day. The eggs hatch in 2-3 days into tiny green caterpillars. Older caterpillars are green and occasionally have tiny red spots on them. Larvae feed on the new leaves of mango until the leaves are about two weeks old. The adult is a black moth with white patches on the hind wings.

(16-042) CONEWORM

Species: *Phycitidae*

Description: These are moderate sized, drab colored moths. Their mouthparts are somewhat snout like. In the caterpillar stage, they bore into the cambium of the trunk, branches, and shoots, or into the fresh green cones. They can girdle and deform young trees. The species that attack cones are among the most damaging insect pests of forest tree seeds.

(16-043) HARVESTER ANTS

Species: *Pogonomyrmex spp.*

Description: They feed principally upon seeds. They nest in the ground and clear the vegetation from the surrounding area. Their clearings reduce the capacity of the range to support stock and wildlife. The workers are red, conspicuously sculptured, medium sized, pugnacious ants with a painful sting.

(16-044) CITRUS FLOWER MOTH

<u>Species:</u>	<i>Prays citri</i>
<u>Host:</u>	Citrus, with a preference for lemon and orange trees
<u>Range:</u>	Pacific Islands including Hawaii
<u>Injury:</u>	The flower buds are attacked by larvae, dry up, and die. The attacked young fruits, devoured from the inside and soiled by frass, are aborted. More mature fruit is deformed and remains small.
<u>Description:</u>	Adults have a wingspan of 10-12 mm, dull gray color, fairly short antennae, and heavily fringed wings. The larva is pale and very small on hatching, pale body that is brownish or whitish with darker head and thoracic plate. The pupa is in a loose cocoon, white and frayed.

(16-047) SHEILDBACKED PINE SEED BUG

<u>Species:</u>	<i>Tetyra bipunctata</i>
<u>Host:</u>	Eastern white pine, jack pine, loblolly pine, longleaf pine, pitch pine, red pine, shortleaf pine, slash pine, Virginia pine
<u>Range:</u>	Eastern states
<u>Injury:</u>	Nymphs and adults feed on seeds, but may feed on shoots. Damaged seeds may be partially or completely hollow.
<u>Description:</u>	Adults are shield-shaped, about 11 to 15 mm long, and are from yellowish to reddish brown, densely marked with dark pits and gray-black mottling.

(16-048) CONEWORM

<u>Species:</u>	<i>Hylemia spp.</i>
<u>Host:</u>	Spruce, mountain hemlock
<u>Description:</u>	These are medium sized, grayish or brownish flies. The larvae are white and compressed and have two large hooks at the head end. They bore through the cones and destroy the seeds.

Figure 22: Spruce cone maggot damage



(16-049) PRAIRIE TENT CATERPILLAR

<u>Species:</u>	<i>Malacosoma lutescens</i>
<u>Host:</u>	Cherry, willow
<u>Injury:</u>	Defoliation of branches, under outbreak conditions, of entire trees. Tents are spun in the forks during May and June; they are used chiefly as resting places, and the caterpillars move out to feed on the nearby foliage.
<u>Description:</u>	The moths are dull reddish brown with a wingspread of 1½ to 2 inches. The forewings have two nearly parallel oblique white bars. The full-grown caterpillars are 2 inches long, brown, with a row of elliptical blue spots down the center and two orange spots on each segment. The sides have pale orange lines and spots.

(16-050) JACK PINE TIP BEETLE

<u>Species:</u>	<i>Conophthorus banksianae</i>
<u>Host:</u>	Jack pine
<u>Secondary host:</u>	Scots pine, red pine
<u>Injury:</u>	Elongating shoots begin to wilt in June, and by midsummer infested twigs tips turn red or brown. Examination shows an entrance hole with a pitch tube from ½ to 1 inch below the terminal cluster. The inside of the tip is tunneled out. It may contain a white legless grub, pupa, or the adult beetle. The injury results in extensive branching in the upper half of the crown.