THREATS TO THE FOREST

INSECTS, PLANTS, AND DISEASES

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INSECTS:

ASIAN LONGHORN BEETLE (ALB)

(Anoplophora glabripennis)

Adult male ALB

Adult female ALB

Pupa ALB

Environmental impact:

ALB larvae create tunnels in the wood and cambial tissue of tree branches and trunks to feed. The tunnels are called galleries, and they can disrupt the flow of sap in trees causing mortality or cause branches of trees to break. Trees in North American have little or no resistance to an infestation. Not found in Pennsylvania as of 2019.

Status: Invasive

Hosts: Maple, box elder, ash, poplar, elm, birch, willow, and other hardwood trees.

Control methods:

Infested counties have developed federally imposed eradication protocols. All infested trees are removed, and all uninfected trees are treated with an insecticide. Do not move firewood.

ALB exit hole

ALB larvae

ALB infested tree

CHERRY SCALLOP SHELL MOTH (CSSM)

(Hydria prunivorata)

CSSM larvae feeding on cherry tree leaves.

Environmental impacts:

The cherry scallop shell moth typically prefers black cherry but will feed on any wild cherry trees. Infested trees may be completely defoliated.

Status: Native

Hosts: Cherry

Control methods:

- → Native parasites, predators, and diseases help to keep the populations in check. A parasitic wasp (Telenomus sp.) preys on the eggs of the cherry scallop shell moth and is known to control outbreaks.
- → Nests and larvae can be handpicked and destroyed.

Adult CSSM

CSSM feeding damage on a cherry tree.

EASTERN TENT CATERPILLAR (ETC)

(Malacosoma americanum)

ETC silk tent. Gypsy Moth and Forest Tent Caterpillar do not spin silk tents.

ETC larvae

Environmental impact:

ETC outbreaks occur every 8-10 years. Before gypsy moth outbreaks, ETC was a significant defoliator of deciduous shade trees in the northeast.

Status: Native

Hosts: Prefers black cherry, crabapple, and apple.

Control methods:

- → ETC larvae are prey for other insects, toads, and birds. Several kinds of small, beneficial wasps parasitize eggs, larvae, or pupae of ETC.
- → Insecticides should be applied in April. Apply to the nests and about one foot of the surrounding branches or trunks.

ETC larvae. Dark head with white/yellow stripe down the back and small blue spots on the sides.

ETC egg mass. Laid/wrapped around twigs.

Adult ETC

ELONGATE HEMLOCK SCALE (EHS)

(Fiorina externa)

Eastern Hemlock branch infested with EHS.

Adult EHS

Environmental impact:

EHS inserts piercing, threadlike mouthparts into the needles of hemlocks and consumes vital nutrients. Excessive loss of fluids hinders the growth rates of the trees. This results in needle drop prematurely and crown thinning. The waxy strands can cause the lower surface of the needles to appear white.

Status: Invasive

Hosts: Hemlock

Control methods:

- → Late May-June is the recommended time to apply an insecticide formulation. Repeated treatments are recommended.
- → Parasitoid wasps (primarily *Encarsia citrina*), the lady beetle, and several species of lacewings are natural enemies of EHS and provide natural population reduction.

Parasitoid wasps and lady beetles are a few of the EHS's natural enemies.

EMERALD ASH BORER (EAB)

(Agrilus planipennis)

Adult EAB

Environmental impacts:

Emerald ash borer larvae feed on the inner bark of ash trees, thus disrupting the tree's ability to transport water and nutrients. Signs and symptoms of an EAB infestation include:

- → Upper crown dieback
- → Bark splitting/flaking
- → D-shaped beetle exit holes in the bark
- → S-shaped larval feeding galleries just below the bark

Status: Invasive

Hosts: Ash trees

Control methods:

- → Tree removal.
- → Insecticides.
- → Multiple introduced parasitoid species are being used to control EAB.

EAB larvae

Feeding damage from the EAB larvae.

FOREST TENT CATERPILLAR (FTC)

(Malacosoma disstria)

FTC larvae. Blue head with white/yellow keyhole markings on their back and blueish colored sides.

Environmental impact:

FTC is a defoliator of hardwood. Larval stages cause damage by defoliating host trees. Typically, trees will recover. Damage includes: reduced growth, branch dieback, and reduced sap flow.

Status: Native

Hosts: Various hardwood species including but not limited to: most maples, and oaks. FTCs avoid red maple and coniferous species.

Control methods:

- → Naturally occurring pathogens like nuclear polyhedrosis virus (NPV) and the fungus *Furia crustosa* help control FTC.
- → Remove and burn egg masses in the fall or winter.
- → Band the trees to prevent the larvae from traveling up and down the tree.
- → The bacteria *Bacillus thuringiensis* variant Kurstaki is effective against the larvae stage of FTC.
- → Chemical insecticides can be used.

FTC egg masses. Laid/wrapped around twigs.

FTC adults

GYPSY MOTH

(Lymantria dispar)

Gypsy Moth adults. Males are tan and females are white.

Gypsy Moth larvae. Yellow head with black markings, blue and red spots on the back.

Environmental impact:

As the caterpillars hatch, they'll climb to the tops of trees and begin to feed on leaves. Although oak species are preferred, gypsy moth caterpillars feed on many other tree and shrub species. It usually takes more than one year of defoliation before trees die, however, conifers that are defoliated may be killed after a single season of defoliation. A major concern of gypsy moth is the potential loss of dominant oak species.

Status: Invasive

Hosts: Oak, aspen, poplar, willow, linden, birch, and apple.

Controls methods:

- → Arial spraying of forests with pesticides to suppress outbreaks.
- → An entomopathogenic fungus species has caused a decrease in populations in North America.

Gypsy Moth egg masses. Tan and covered with fine hairs, usually laid on tree bark. Typically, 1-3" long.

HEMLOCK WOOLLY ADELGID (HWA)

(Adelges tsugae)

HWA infested Eastern Hemlock. These white wooly masses (ovisacs) are found at the base of the needles and house the HWA and its egg masses.

Magnified view of the HWA.

Environmental impact:

The egg sacs of HWA look like the tips of cotton swabs clinging to the undersides of hemlock branches. Adelgids feed on plant sap. Thus, they interfere with the tree's natural use of nutrients and cause:

- → Needle drop
- → Branches dieback
- → Tree mortality

Status: Invasive

Hosts: Hemlock

Control methods:

The DCNR Bureau of Forestry uses integrated pest management principles. They use the following methods:

- → Biological Control
- → Insecticides
- → Silvicultural
- → Tree breeding for host resistance

Eastern Hemlock dieback due to HWA.

HWA adult with eggs in white wooly ovisac.

SPOTTED LANTERNFLY (SLF)

(Lycorma delicatula)

Adult SLF with wings open.

Adult SLF with wings closed.

Environmental impact:

SLFs feed on the sap of over 70 valuable crops, including: hardwood trees, hops, grapes, apples, and various other fruit and vegetable crops. As they feed, they secrete a sticky substance called “honeydew”. Honeydew causes the growth of a “black sooty mold” which can cover leaf surfaces and stunt growth. Plants with heavy infestations may not survive.

Status: Invasive

Hosts: Grapes, hops, apples, hardwoods, and especially tree of heaven.

Control methods:

- → Remove/destroy egg masses by scraping eggs into a bag containing hand sanitizer or rubbing alcohol.
- → Band trees- wrap the trunk of the tree in a sticky material.
- → Apply insecticides.
- → Be careful to not move egg masses and life forms from quarantine zones.

SLF early stage nymph. Black with white spots, found April-July. Size: 1/8” – 1/4”.

SLF late stage nymph. Red and black with white spots, found July-September. Size: 1/2”.

SLF egg masses are covered in a protective coating. Fresh egg masses (left) appear glossy and look like a gray smear of mud. As older egg masses begin to dry they resemble cracking mud (right). Each egg mass typically has 30-50 eggs. Egg masses can be laid on anything smooth. Can be found September-June.

WALNUT TWIG BEETLE (WTB)

(Pityophthorus juglandis)

An adult WTB is roughly the size of the "I" in the word "LIBERTY" on the U.S. Dime.

Environmental impacts:

WTBs are a vector of a fungus that causes Thousand Canker Disease (TCD). TCD is an accumulation of many small branch and stem cankers that can kill an infected tree.

Status: Native to Arizona, New Mexico, California, and northern Mexico.

Hosts: Walnut

Control methods:

- → Two parasitic wasps, *Neocalosoter pityophthori* and *Plastonoxus westwoodi* species help control WTBs.
- → Remove infested wood piles and prune trees during winter months.
- → No control is available once a tree has become infected.

Cankers found under the bark of a Walnut tree caused by WTB spreading thousand cankers disease.

DISEASES:

ANTHRACNOSE

Crown dieback cause by Anthracnose.

Environmental impact:

Common signs of anthracnose include: brown or dead spots on leaves and curling or loss of leaves. The lower inner leaves and branches will show the most severe symptoms. Severity of anthracnose depends on weather, long wet conditions early in the season will result in a stronger infestation.

Hosts: Deciduous hardwoods are most susceptible

Control methods:

- → Prune dead branches and twigs.
- → Rake and destroy fallen leaves around susceptible trees.
- → Fungicides can be applied in certain cases.

Brown dead spots on leaves caused by Anthracnose.

ARMILLARIA ROOT ROT

(Armillaria)

Rhizomorphs are root-like strands of fungi. They spread diseases to neighboring roots.

Environmental impact:

Young trees often show symptoms much more rapidly when compared to mature trees. The fungus produces long, black, string-like strands called rhizomorphs. Symptoms include:

- → Reduced growth.
- → Yellowing and browning of needles.
- → Whitish colored resin at the base of the trunk.
- → Off white fungus between bark and wood at the root collar.
- → Mushroom growth near decaying wood in the fall.

Hosts: Susceptible plants include those under stress from extreme situations such as drought, insect defoliation, root injury, or recent transplants.

Control methods:

- → Don't plant in areas that have had previous issues with Armillaria.
- → Remove diseased trees and all infected wood (burn it on site).
- → Fungicides are not recommended.

White fungus and resin at the base of the infected tree's trunk.

Browning of needles Armillaria root rot.

BEECH LEAF DISEASE (BLD)

Dark green interveinal banding pattern on Beech foliage cause by BLD.

Environmental impact:

- → Beech tree foliage becomes discolored and heavily shriveled.
- → Shriveled, discolored, and deformed leaves clustered near the branch tips as well as reduced leaf and bud production.
- → Mortality is common in saplings.

Hosts: Beech

Control methods:

- → No effective management or eradication solutions have been developed.
- → Management of the disease should focus on prevention.
- → Selectively breed resistant trees.

Dark green interveinal banding pattern on Beech foliage cause by BLD.

BOTRYOSPHAERIA CANKER

(Botryosphaeria dothidea)

Rough, sunken, dark brown to black areas form around wounds or natural openings in the bark.

Environmental impact:

Botryosphaeria is a fungus that infects plants by entering through natural openings such as lenticels or pruning cuts. Some common symptoms include: rough dark areas form around natural openings and wounds in the tree, bark dies and fall off cankered areas, and infected branches will lose their leaves. Plants most susceptible are those experiencing drought.

Hosts: Many woody ornamentals including: rhododendron, crabapple, pine, walnut, tulip poplar, beech, dogwood, azalea, rose, willow, and elm.

Control methods:

- → Prune infected branches, irrigate during droughts to minimize stress.
- → Plant resistant species in areas prone to drought.

Dead bark falls off the cankered area.

DIPLODIA CORTICOLA ON OAK

(Diplodia corticola)

Crown dieback due to *Diplodia corticola.*

Environmental impact:

This aggressive disease affects oak by limiting the tree's ability to absorb nutrients and water. This results in tree death. Some symptoms include, clumps of dead branches, crown thinning, bark bleeding, and cankers on branches.

Hosts: Oak

Control methods:

- → Protect trees from environmental stresses such as pests, droughts, and injury.
- → No other specific management is known for *Doplodia corticola.*

Bark bleeding and cankers due to *Diplodia corticola.*

DIPLODIA TIP BLIGHT (DTB)

(Diplodia pinea)

Needle dieback due to Diplodia Tip Blight.

Diplodia kills needles at the tips of branches. Symptoms often start on the lower half of the tree and progress upwards.

Environmental impact:

The cause of DTB is the fungus *Diplodia pinea*. It's the most common disease affecting pine trees in Pennsylvania. Some of the more common symptoms include:

- → Brown, yellow, or gray colored needles.
- → Branch dieback.
- → Cankers form on stems and branches.
- → An oozing resin that adheres to infected needles.
- → Small, black fruiting bodies that stick to needles and cones.

Hosts: Pines

Control methods:

- → Do not plant trees near any areas with past infections of Diplodia.
- → Do not plant trees in sites prone to extreme environmental conditions.
- → Prune and remove infected areas during dry weather.

OAK WILT DISEASE (OWD)

(Bretziella fagacearum)

OWD usually causes leaves to brown from the tip to the base of the leaf discoloration and defoliation which can lead to death.

Environmental impact:

- → OWD is caused by the fungus Bretziella fagacearum.
- → Sap-feeding and bark beetles spread the spores of the fungus as they move from tree to tree.
- → The fungus remains viable under firmly attached bark.
- → Transportation of infected logs is one way the fungus is moved long distances.

Hosts: Oak

Control methods:

- → To remove an infected tree, break root grafts to nearby oaks before removing the tree. Then bury, burn, or debark the logs and stumps.

OWD usually causes leaf discoloration and defoliation which can lead to death.

Black and grey mats of fungus may develop beneath the bark.

PHYTOPHTHORA ROOT ROT

(Phytophthora spp.)

Red and brown needle discoloration caused by Phytophthora Root Rot.

Environmental impact:

There are more than 100 different species of *Phytophthora*, common signs and symptoms include:

- → Reduced/stunted growth.
- → Red-brown needles or needle loss.
- → Root decay.
- → Bleeding basal cankers.
- → Death.

Hosts: Various Christmas tree species, True firs, Douglas firs, spruce, and eastern white pine.

Control methods:

- → Do not plant in fields that have had *Phytophthora* infestations.
- → Do not overfertilize or overwater trees.
- → Remove and test suspicious trees.
- → Burn infected trees.

RHIZOSPHAERA & STIGMINA NEEDLE CAST:

(Rhizosphaera kalkhoffii & Stigmina lautii)

Typically needle cast symptoms first appear on the lower branches of a tree and work from the inside of the tree out.

Environmental impact:

Rhizosphaera and Stigmina are the most common needle cast diseases. These fungal diseases affect mature spruce trees growing outside of their natural habitat. Blue spruce is most susceptible. Optimal conditions for this disease occur in the spring when times of excess moisture and humidity are common. The infection starts at the base on the inner branches and progresses up the tree.

Host: Spruce

Control methods:

- → Spraying fungicides twice in the spring and then once a month during periods of wet weather.
- → Thinning/pruning trees allows for more airflow and results in drier needles. Wet needles may fuel the disease progression.
- → Avoid planting susceptible trees in areas with needle cast diseases.

Needles that show signs of being infected with a needle cast.

VERTICILLIUM WILT

(Verticillium dahliae)

Two trees showing the symptoms of Verticillium Wilt. Symptoms are usually most noticeable in midsummer during hot, dry periods. Leaves suddenly wilt and dry up.

Environmental impact:

Verticillium wilt is caused by a soil fungus. Common symptoms include: wilting branches on one side of the tree, yellowing leaves, brown or burnt looking leaf margins, and dead twigs and bark.

Hosts: Trees, shrubs, vines, fruits and vegetables, and herbaceous ornamental.

Control methods:

- → Prune dead branches.
- → Fertilize and avoid damaging root system, branches, and trunks.
- → Remove severely infected trees
- → There is no known chemical control for this disease.

Infected branches will show a ring of discoloration.

THOUSAND CANKERS DISEASE (TCD)

(Geosmithia sp.)

TCD is transported by the Walnut Twig Beetle (above). Yellowing leaves and crown dieback are common symptoms of TCD (left).

Environmental impacts:

TCD results from the combined activity of a fungus (*Geosmithia morbida*) and the Walnut Twig Beetle. These beetles tunnel beneath the bark of walnut trees and cause small cankers to form. Early symptoms include: yellowing leaves and thinning in the upper crown of the tree.

Hosts: Black Walnut

Control Methods:

- → Quarantines have been put in effect in counties where TCD is present. The quarantine restricts the movement of all walnut material, as well as restricts the movement of walnut and hardwood firewood.

Branch cankers that have developed under the bark around WTB galleries.

WHITE PINE NEEDLE DISEASE (WPND)

(Leucosticte lacicola & Lophophacidium dooksii)

Fungi on White Pine needles.

Yellowing of older needles resulting in a thinner canopy.

Environmental impact:

Lecanosticta lacicola and *Lophophacidium dooksii* are the two most commonly reported fungal diseases affecting northeastern white pine. WPND is spread by rain splash during periods of wet weather. Typically, infection happens in the spring. These fungi cause the previous year's needles to yellow and eventually fall causing the canopy to appear thin.

Hosts: White pine

Control methods:

- → Limit environmental stresses such as drought
- → Avoid planting in areas that have had previous problems with these diseases

Yellowing of older needles resulting in a thinner canopy.

PLANTS:

AUTUMN-OLIVE

(Elaeagnus umbellata)

Environmental impact:

Autumn Olive is a deciduous shrub that can reach heights of 20'. It creates dense shade that blocks out sunlight to the plants below and outcompetes native plant species. It can produce over 200,000 seeds a year and spread very quickly.

Status: Invasive

Habitat: Shade tolerant, can be found in open fields, along forest edges, roadsides, prairies, and other disturbed areas.

Control methods:

- → Hand pulling seedlings.
- → For larger plants, you will need to cut and apply herbicide to the stump frequently from summer-winter.

Flowers occur in June and July, are aromatic, pale yellow, fused at the base with 4 petals pointed at the tips (left). Fruits are produced August through October, are small, red-brown to pink and dotted with brown or silvery scales and are very abundant (right).

BUSH HONEYSUCKLE

(Lonicera maackii, Lonicera morrowii, Lonicera x bella, Lonicera standishii, Lonicera tatarica)

Bush honeysuckles species flower between May and June producing tubular, fragrant flowers. The flowers tend to be either yellowish white or pink.

Environmental impact:

Bush Honeysuckle spreads quickly and grows in a wide range of environments. Its prolific nature displaces native plants and disrupts species diversity.

Status: Invasive

Habitat: Thrive in full sun but also do well in shady conditions and varying moisture conditions. They are often found in abandoned fields, along roadsides, around marshes, and in disturbed woodlots.

Control methods:

- → Smaller plants can be hand pulled, making sure to remove the entire root system.
- → Applying herbicides to the leaves or freshly cut stumps can help control bush honeysuckle.
- → Conducting prescribed burns for several growing seasons will reduce the population.

Bush honeysuckles species flower between May and June producing tubular, fragrant flowers. The flowers tend to be either yellowish white or pink.

Bush Honeysuckle species produce fruit that mature between July and August. Berries range in color between red and orange.

GLOSSY AND COMMON BUCKTHORN

(Rhamnus frangula and Rhamnus cathartica)

Environmental impact:

This plant forms dense thickets that crowd out native plants. It is a host of oak crown rust, which leads to declining oak quality in the surrounding area. Birds feed on the berries and quickly spread seeds throughout the forest creating a seed bank that will quickly take advantage of any new canopy gaps and out-compete native tree seedlings.

Status: Invasive

***Habitat*:** Open oak woodlands, tree fall gaps and forest edges, prairies, and open fields.

Control methods:

- → Smaller seedlings can be hand pulled, larger plants can be cut.
- → Herbicides should be applied directly to the freshly cut stump.

Clusters of red to black ¼" fruit ripen on female plants in August and September. Seeds are viable for 2 - 3 years in the soil. Each berry has two to four seeds.

Leaves are alternate, sometimes opposite; broadly elliptic pointed at the tip, smooth, dark glossy. Leaves stay green late into fall.

GARLIC MUSTARD

(Alliaria petiolata)

Small, white 4-petaled flowers appear in early spring and are in clusters at the top of the stem. Plants often smell like garlic, especially when leaves are crushed.

Environmental impact:

Garlic mustard is very shade tolerant and will invade mature and established forests.

Status: Invasive

Habitat: River floodplains, forests, edges and openings.

Control methods:

- → Small infestations can be hand pulled.
- → Glyphosate may be useful when dealing with heavy infestations.
- → **Prevention:** Infestations can be prevented by monitoring and removing any garlic mustard plants.

    - ❖ Chemical control is best done in late fall when most native plants are dormant for the winter.

Typically grows to about 3' tall but can be anywhere from a few inches to over 6' tall depending on conditions. First year plants are low-growing rosettes with rounded, kidney-shaped leaves, scalloped on the edges.

GIANT HOGWEED

(Heracleum mantegazzianum)

Typically grown between 7-14' tall. Produces white flowers with 50-150 flower rays clustered into an umbrella shaped flower cluster up to 2.5' across. Leaves can be up to 5' across. Stems are green with extensive purple splotches and prominent coarse white hairs. Stems are also hollow, ridged, 2-4" in diameter, and have a thick circle of hairs at base of leaf stalk.

Environmental impact:

Mature plants can reach 20' tall and are an aggressive competitor to native plant species. During the winter, it dies and leaves vulnerable patches along riverbanks and steep slopes that are then susceptible to soil erosion.

Status: Invasive, PA Noxious Weed

Habitat: Prefers open areas with full sun and moist soil.

Threat to humans:

- → DO NOT TOUCH THIS PLANT! Sap from a giant hogweed plant causes sensitivity to UV light and can lead to skin blisters and severe burns. It can also cause permanent blindness.

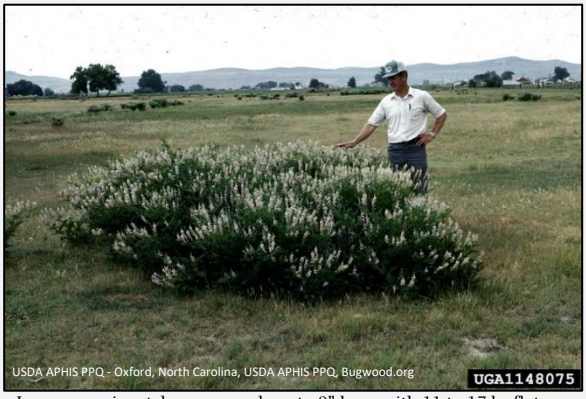
Control methods:

- → Individual plants can be dug up and removed, repeated mowing is also effective. Extreme caution should be taken when using these methods and proper protection should be used.
- → Cows and pigs are unaffected by the sap and can eat giant hogweed without harm.
- → Glyphosate can be applied in the spring or early summer.
  - ❖ Glyphosate is nonselective and may kill other plants around the targeted species.

Giant hogweed is on the Pennsylvania Noxious Weed Control List. It is illegal to sell, plant or transport this species. If you believe that you have found a new population of this plant, please contact the PA Dept. of Agriculture, at 717-787-7204).

GOAT'S RUE

(Galega officinalis l.)



Typically grows to 3' tall at maturity. Leaves are pinnately compound, up to 9" long, with 11 to 17 leaflets that are under 2" long. Spikes of 20 to 50 small purple or white flowers appear in June and continue throughout the growing season. Each flower produces a small pod with up to nine yellow seeds.

Environmental impact:

Goats rue is a member of the legume family native to southern Europe and western Asia. They average 3' tall but can reach heights of 6'. Consuming these plants is fatal to goats, sheep, and cattle. Seeds can last up to 27 years in the soil.

Status: Invasive, PA Noxious Weed

Habitat: Prefers full sun

Control methods:

- → Typically treated with a combination of chemicals and mowing. Repeated treatments are necessary.

Goat's Rue is on the Pennsylvania Noxious Weed Control List. It is illegal to sell, plant or transport this species. If you believe that you have found a new population of this plant, please contact the PA Dept. of Agriculture, at 717-787-7204).

JAPANESE BARBERRY

(Berberis thunbergii)

This deciduous shrub, with arching branches typically grows to about 2-3' tall. Berries are small, bright red, and egg-shaped that are about 1cm long. They ripen in midsummer but remain on stems into winter. Leaves are small ,oval to spoon shaped, with smooth margins. The leaves are arranged in clusters along the stem and turn red in fall.

Environmental impact:

Japanese barberry is a fast spreading species; it crowds out native plants and serves as the perfect environment for ticks. Research has shown that tick populations are much greater in areas with Japanese barberry.

Status: Invasive

Habitat: Forests, pastures, fields, and along forest edges.

Control methods:

- → Young plants can be hand pulled, however, gloves are necessary due to the spikes on the twigs.
- → Herbicides such as glyphosate or triclopyr should be applied directly to freshly cut stumps.

JAPANESE HONEYSUCKLE

(Lonicera japonica)

This woody vine can climb/trail over 80' Flowering occurs from April to July, when showy, fragrant, tubular, whitish-pink flowers develop in the axils of the leaves. The flowers turn cream-yellow as they age. When its stems are young, they are slightly red in color and may be fuzzy. Older stems are brown with peeling bark and are often hollow on the inside.

Environmental impact:

The vines wrap around neighboring vegitation. This strangling can casue small saplings and shrubs to die. On larger trees this acts as a stressor and weakens the tree making them more susceptible to drought, disease, and pests. Japanese honeysuckle forms dense mats in the tree canopy, shading out any vegetation below.

Status: Invasive

Habitat: Forests, wetlands, farm fence rows, and roadsides.

Control methods:

- → Repeated hand pulling is effective; however, mowing is not recommended.
- → Several herbicides, including glyphosate and triclopyr are effective.

JAPANESE HOPS

(Humulus japonica)

This vine can grow up to 35' in a season. Its leaves are roughly 2-6" long and have toothed edges with 5-7 lobes. Stems and leaves have hooked hairs. flowers in mid-late summer followed by seed production.

Environmental impact:

Japanese hops are a fast-growing vine that forms dense thickets that outcompete native plants.

Status: Invasive

Habitats: Prefers moist soils and full sun

Control methods:

- → Hand pulling before the vine flowers is effective. Gloves should be worn to protect against the hooked hairs that can cause skin blistering. Mowing has limited success as the vines quickly regrow.
- → Herbicides should be applied to the leaves ideally from July-September.

JAPANESE KNOTWEED

(Polygonum cuspidatum)

This dense growing shrub can reach heights of 10'. Branched sprays of small greenish-white flowers appear from August to September. The leaves are broad and rounded at the base and tapering toward the end.

Environmental impact:

Japanese knotweed spreads quickly forming dense growths that outcompete native plants. These dense growths can block small streams and disrupt the native vegetation on the banks. This results in an increase in erosion and can negatively affect the stream ecosystems.

Status: Invasive

Habitats: Streams, riverbanks, wet meadows, roadsides, and vacant lots.

Control methods:

- → Aggressive mowing can control knotweed. Mowing will need to occur throughout the growing season.
- → Cut all the stems in early June. Wait 6-8 weeks until the regrowth is roughly 4' tall. Apply glyphosate-based herbicides. Use aquatic safe varieties of glyphosate when applying near water. May take several years to control.

JAPANESE STILT GRASS (JSG)

(Microstegium vimineum)

This bright green grass has leaves that are 1-3" long with a noticeable stripe of silvery, reflective hairs down the length of the upper surface. Typically grows up to 3' tall.

Environmental impact:

JSG outcompetes native plant species. These invasions can change soil composition, inhibit tree growth, and reduce light availability for the plants below. In late fall, JSG forms a thick layer on the forest floor that decomposes slowly and smothers native species. Deer will not eat it.

Status: Invasive

Habitat: Open woods, floodplain forests, wetlands, fields, thickets, roadsides, and ditches.

Control methods:

- → JSG is shallow-rooted, making it easily pulled by hand.
- → Herbicides are effective for extensive infestations.

KUDZU

(Pueraria montana var. Lobata)

This climbing vine can grow 1' per day and reach lengths of over 100'. Leaves consist of three broad leaflets up to 4" across, leaflets may be entire or lobed with hairy margins.

Environmental impacts:

Kudzu smothers native plants by engulfing entire plants, and uprooting trees by weighing them down. The leaves often have a lobe, making them look like mittens.

Status: Invasive

Habitat: Roadsides, forest edges, and old fields.

Control methods:

- Repeated cutting during the growing season can be effective.
- Cutting the stem 2" above the ground and applying a 25% glyphosate or triclopyr and water solution to the stem.

Flowers are reddish to purple and are bloom in July-October.

Outer leaflets typically have three lobes while the middle leaflet has one lobe. Outer leaflets may appear resemble a mitten.

LESSER CELANDINE

(Ficaria verna)

This low growing perennial grows in thick mats. Its flowers are yellow and bloom from late April to mid-May. Leaves are kidney shaped and have wavy edges.

Environmental impact:

Lesser celandine is a fast-growing plant that emerges earlier than most native species. It easily outcompetes native plants by forming a thick carpet of vegetation. This negatively impacts pollinators, which rely on the native plants for pollen when other food sources are scarce.

Status: Invasive

Habitat: Prefers moist sandy soils, can be found in low open woods, meadows, roadsides, and disturbed areas.

Control methods:

- → Can be hand pulled or dug up, making sure to remove all root systems and tubers.
- → Chemical control has a small window of opportunity. Herbicides should be applied in March-May

MILE-A-MINUTE

(Persicaria perfoliate)

This vine can grow up to 6" per day. Its leaves are light green and shaped like a triangle. The vines and the undersides of leaves are covered with recurved barbs that aid in its ability to climb. From mid-July though the first frost, green fruits appear, turning a metallic blue color as the season goes on.

Environmental impact:

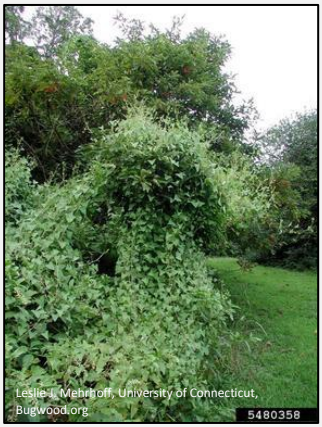
This aggressive annual vine quickly grows over vegetation and blocks out light, water, and nutrients for the underlying plants.

Status: Invasive

Habitat: Forest edges, wetlands, stream banks, and roadsides.

Control methods:

- → Hand-pulling of vines.
- → Foliar Herbicide application
- → A weevil (*Rhinocominus latipes*) is currently being used in various testing locations. These small insects feed on leaves and bore into the stems of the plant.



MULTIFLORA ROSE

(Rosa multiflora)

This perennial shrub can grow to a height of 10-15' and to a width of 9-13' The red-to-green twigs may have numerous recurved thorns. Clusters of fragrant, white to white-pink, flowers bloom in late May or June. Flowers are ½ - 1" in diameter.

Environmental impact:

Multiflora rose forms impenetrable thickets that outcompete native plants. This plant has a habit of climbing over trees and weighing them down, often results in damage to native species.

- → A single plant can produce over a million seeds a year
- → The hips are readily eaten by birds, which are the primary seed dispersers.

Status: Invasive

Habitat: Forests, stream banks, roadsides, open fields, and prairies.

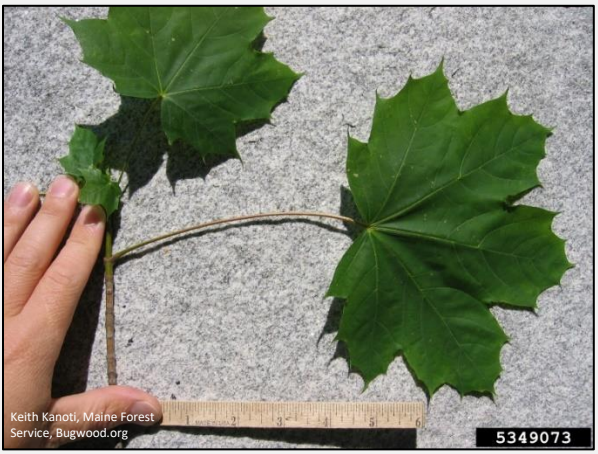
Control methods:

- → Frequent mowing or cutting.
- → Herbicide applied to freshly cut stems.
- → Rose rosette disease, a native viral pathogen, and European seed chalcid, a seed infesting wasp. However, both these options have the potential to harm the native rose population. Goats are emerging as a viable option.

Leaves grow with 5, 7, 9, or 11 oval, saw-toothed leaflets.

NORWAY MAPLE

(Acer platanoides)



Leaves are five lobed and resemble sugar maple leaves but tend to be wider. Leaves are dark green in the summer and roughly 3-6" long. Produces small pale-yellow flowers and winged seeds.

Environmental impact:

Norway maple outcompetes sugar maple and is very shade tolerant. It forms a dense canopy that shades out native vegetation below.

Status: Invasive

Habitat: Tolerance to many types of soils and climate conditions

Control Methods:

- → Hand pulling seedlings.
- → Applying herbicides to freshly cut stumps.

Bark is gray and fairly tightly ridged and furrowed.

Norway maple terminal buds are large, rounded, and blunt, with only 2–3 pairs of scales; sugar maple has long, sharply pointed buds with many scales.

ORIENTAL BITTERSWEET

(Celastrus orbiculatus)

This climbing woody vine can grow up to 60'. Its leaves are circular, light green, and 2-5" long. The small round fruits are green when young; ripen to yellow; then split to reveal showy, scarlet berries that persist into winter.

Environmental impact:

Oriental bittersweet overtakes native trees and plants by climbing over them. The weight of the vines often leads to limb breakage

Status: Invasive

Habitat: Open forested areas, along roadsides, fields, grasslands, and woodland edges.

Control methods:

- → Hand pulling and mowing can remove light infestations.
- → Herbicides are most effective when applied directly to freshly cut stems.

PALE AND BLACK SWALLOW-WORT

(Cynanchum louiseae and C. rossicum)

Pale Swallow-Wort flowers are star like and pink to maroon in color.

Black Swallow-Wort flowers are star-like and a deep purple to black color.

Environmental Impact:

Swallow-worts are related to milkweeds and are likewise toxic to livestock and butterflies. Pale swallow-wort can easily crowd out native species.

Status: Invasive

Habitat: They thrive in a wide range of soils, except for extreme moisture.

Control methods:

- → To prevent seeds from spreading, they must be removed before the pods open. Hand-pulling is typically unsuccessful.
- → Herbicides can be applied while the plant is growing after the flowers have sprouted.

Both species have long, oval, opposite leaves about 3-4" long by 2-3" wide.

PRIVET

(Ligustrum spp.)

This shrub has leaves that are dark green, 1-3" long, and may develop russet or purplish colors in the fall.

Environmental Impact:

Privet form dense thickets that outcompete many native plants. It can be found at elevations less than 3000'.

Status: Invasive

Habitat: Floodplains, forests, wetlands, and fields.

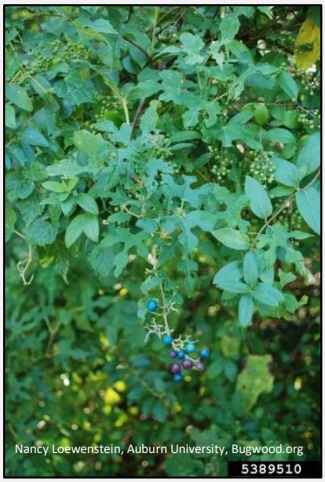
Control Methods:

- → Hand pulling and mowing can be effective for smaller infestations
- → Foliar spray can be used for larger populations

Typically grows 10-15' tall. Creamy-white, four-petaled flowers in 1-2" pyramid-shaped panicles bloom in June-July. The fruit clusters are black and berry like. They ripen during September and October and persist through the winter. Mature specimens can produce hundreds of fruits.

PORCELAIN BERRY

(Ampelopsis brevipedunculata)



This climbing vine leaves are deeply lobed and resemble grape leaves. Both the underside of the leaves and the young twigs are hairy to the touch. Small greenish-yellow blooms in mid-summer are followed by clusters of shiny, hard berries in various shades of white, yellow, lilac, or green that mature to a bright turquoise blue.

Environmental impact:

Porcelain berry grows quickly and smothers native plants. The vine grows and climbs up trees forming opaque mats in the canopy that shade out the plants below.

Status: Invasive

Habitat: In PA, it is typically found around Pittsburgh and Philadelphia.

Control methods:

- → Repeated hand pulling is effective.
- → Larger vines can be treated by cutting and applying herbicides.

TREE OF HEAVEN

(Ailanthus altissima)

This rapidly growing tree can reach heights of 80-100' and up to 6' in diameter. The bark of tree-of-heaven is smooth and green when young, eventually turning light brown to gray, resembling the skin of a cantaloupe.

Environmental impact:

Tree of heaven produces an allelopathic chemical in its leaves, roots, and bark that will limit or prevent the establishment of other plants. Spotted lanternfly, an invasive insect, is particularly attracted to this tree. Female trees are prolific seeders with the potential to produce more than 300,000 seeds annually.

Status: Invasive

Habitat: The trees are not shade tolerant, saplings are typically found around forest edges, fields, and roadsides.

Control methods:

- → Hack and squirt with glyphosate and basal oil spray with triclopyr herbicides are the most effective methods to control tree of heaven. Smaller trees can be controlled with a foliar application. All herbicide applications should be applied during the growing season.
- → If only cut down but not treated with an herbicide this tree can can spread vegetatively through root suckers creating large clonal groves.

Human health concerns:

- → It's a high pollen producer and moderate source of allergens.
- → Multiple cases of dermatitis have been reported from contact with the tree.
- → There are reports of myocarditis (inflammation of the heart muscles) from exposure to sap through broken skin, blisters, or cuts.

One leaf can range in length from 1-4' with anywhere from 10 to 40 leaflets. When crushed, the leaves and all plant parts give off a strong, offensive odor – often described as rancid peanut butter.

WAVY LEAF BASKET GRASS (WLBG)

(Oplismenus hirtellus ssp. undulatifolius)

This low growing grass has leaf blades that are roughly 1.5-4" long with rippling waves across the blade. The leaf sheaths and stems are noticeably hairy. When it blooms, from mid-September to November, the grass spikelets form long sticky awns. The sticky awns allow the grass seeds to adhere to passing animals, people, and vehicles.

Environmental impact:

WLBG completely covers the forest floor, out competing native forest plants. This results in depleted plant diversity. Long-term ecological effects are relatively unknown.

Status: Invasive

Habitat: Shaded and moist deciduous forests.

Control methods:

- → Small populations can be hand pulled, contact with larger populations should be avoided to prevent the spread of sticky seeds.
- → Remove seeds from clothing and other gear by using duct tape.
- → Chemical treatments are effective. Recommended herbicides are glyphosate and clethodim.

WINGED BURNING-BUSH

(Euonymus alatus)

This shrub normally grows 5-15' high. Its leaves are dark green in the spring but turn a brilliant purple-red in the fall. Inconspicuous, greenish flowers occur in late spring and red-purple fruits mature during summer.

Environmental impact:

Burning bush is a deciduous shrub that can reach up to 15' in height, once established it will displace native vegetation. Burning bush is highly adaptable and can thrive in a variety of environments including full shade.

Status: Invasive

Habitat: Adaptable to a variety of soil types and pH levels, is very shade and salt tolerant. Typically, doesn't do well in dry areas.

Control methods:

- → Seedlings can be hand pulled
- → Glyphosate can either be sprayed or applied directly on freshly cut stumps

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