

# Birch Leafminer

## What is it?

The birch leafminer is an invasive insect pest that affects a variety of birch trees including paper birch. Adult birch leafminers are small, black sawflies about 3 mm long. Larvae are small, white, and slightly flattened. The leafminer is native to Europe and was accidentally introduced into the United States during the 1920s.



birch leafminer damage

## Life Cycle and Damage

Birch leafminers undergo complete metamorphosis. The larval stage is the primary source of damage to the tree. In the spring, adult birch leafminers emerge from the ground where they overwintered as mature larvae. Females then lay hundreds of eggs in developing birch leaves (1 – 20 eggs per leaf). After the eggs hatch, the larvae feed in the leaves. Birch leafminers are a type of skeletonizer. The birch leafminer larvae



adult sawfly



leafminer larva

eat the cells between the upper and lower leaf surfaces but they do not eat the veins of the leaves. Leaves begin to turn brown as a result. Repeated leaf loss over the entire tree weakens the tree and makes it less resistant to other insects and diseases. When the larvae mature, they drop to the ground where they turn into adults. The second generation adults also lay eggs. The larvae from these eggs over-winter beneath the ground.

## Signs and Symptoms

Larvae feeding eventually causes large brown blotches on the leaves and gradual leaf death. Some birch trees are almost completely defoliated as a result of feeding activity by the larval stage of this insect.

## Controls/Prevention

Pesticides can be sprayed on the leaves when the adult black sawflies are active. Pesticides can also be injected into the soil where they are taken up through the tree roots to control the larvae. Release of parasitic wasp species, natural enemies of this pest, has proven to be helpful and has decreased the frequency of outbreaks.



severe leaf loss

# Chestnut Blight

## What is it?

The chestnut blight is a canker disease that affects American chestnut trees and is caused by an invasive fungus. Chestnut blight fungus was introduced to the United States in the late 1800's on Chinese chestnut trees imported from China. The trees were planted in New York botanical gardens and the Bronx Zoo. The Chinese chestnut is resistant to the fungus, so they are not affected by the disease. The blight is easily spread to American chestnut trees by wind, rain and the feet of birds. The American chestnut has no natural resistance to the fungus. By 1904, many American chestnuts in New York were starting to die from the blight. Before the introduction of the blight in the United States, one out of every four trees in the eastern United States was an American chestnut. By 1950, mature American chestnuts were mostly extinct as a result of the blight.



orange canker

## Life Cycle and Damage

The chestnut blight enters the tree through small wounds which are mostly caused by insects feeding. The blight then grows on the inner bark of the tree and eats away the bark. The blight eventually eats a ring all the way around the tree, girdling the tree and the tree eventually dies. Spores (the fruit of the fungus) can live in the soil for years before landing on a chestnut tree and infecting it.



American chestnut sprout

## Signs and Symptoms

The chestnut blight lives only in the trunk and branches of American chestnut trees. The fungus makes an orange canker on the trunk of diseased trees. Root systems are resistant to the blight and can survive. From the roots new American chestnut trees sprout, even 100 years later. The new trees, however, rarely grow enough to produce seeds before the blight attacks and kills them.



historical photograph of an American chestnut

## Controls/Prevention

The American Chestnut Foundation has been working to protect American chestnuts that show a degree of blight-resistance. They have started a project to hybridize American trees with Chinese trees. Generations of backcrossing with American chestnuts have yielded a tree that is approximately 94% American and expected to show a high degree of blight-resistance.

“Chestnuts were once so numerous along the eastern forests of the U.S. that it is said a squirrel could jump from chestnut tree to chestnut tree all the way from Georgia to New York without ever touching the ground.” – US Fish and Wildlife Service

# Dutch Elm Disease

## What is it?

Dutch elm disease is a vascular wilt disease in elm trees caused by an invasive fungus. American elms are more susceptible to the disease than other elm species. Dutch elm disease was first discovered in the United States during the 1930's. The fungus' native country is unknown but thought to be somewhere in Asia. The disease got its name from the Dutch scientists who first studied the disease. The fungus was introduced to the U.S. accidentally on diseased logs imported from Europe.



flagging in an elm tree

## Life Cycle and Damage

The fungus can be transmitted through touching root systems or by insects carrying the fungus. The native elm bark beetle and the smaller European elm bark beetle lay eggs in the inner bark of the tree. After the eggs hatch and the beetles mature, they bore their way out of the tree. When they do this, the beetles can pick up the fungus spores. The beetles carry the fungus spores to other trees. When the fungus enters an elm tree, it clogs the tree's xylem. Xylem are the cells that carry water and nutrients through the tree. When the xylem is clogged, the tree starves to death. The disease spreads rapidly throughout the tree resulting in death in 2-3 years.

## Signs and Symptoms

One of the early symptoms of Dutch elm disease include "flagging". Flagging is when the leaves on upper branches curl, turn yellow and wilt. Soon after one branch shows signs of flagging, adjacent branches also show signs, followed by major canopy dieback. If a tree is suspected to have Dutch elm disease, bark can be peeled off of affected branches to look for additional signs. The presence of brown bands or streaks in the wood beneath the bark is further evidence of the disease. This sign is referred to as vascular staining and is the most distinctive sign of Dutch elm disease that can be observed in the field.

## Controls/Prevention

There are several methods of control depending on the situation. In trees that have been recently infected, dead and dying branches should be pruned and destroyed. Insecticides can be used to kill the beetles that spread the fungus. Fungicides can be injected into the tree to kill the fungus.



vascular staining

# Emerald Ash Borer



## What is it?



EAB adult

Some campers think that it is easier to bring their own firewood to a campsite rather than collect local wood. It may be easier, but it can have major effects on the local forest. One bark-boring insect transported by firewood is a small, invasive insect called the emerald ash borer, also known as EAB. EAB is responsible for the death of millions of ash trees in North America. EAB is an introduced species of beetle that is native to Asia. It is thought that EAB arrived in the United States on solid wood packing material carried in cargo ships or planes. It was first found in the United States in 2002 in Michigan and has since been found in several states including Pennsylvania where it was first detected in 2007. EAB is known to infest all species of ash trees in North America.

Adult EAB are bright metallic green in color, approximately ½ inch long, and have flattened backs and purple abdominal segments beneath their wing covers.



actual size



## Life Cycle and Damage



“S” galleries

The EAB undergoes complete metamorphosis. Adult EAB feed on the trees' leaves but do very little damage to the trees. The primary source of damage is EAB larvae. The adults lay their eggs between layers of bark or in crevices in the bark. The larvae hatch in about one week and bore into the tree where they feed on the inner bark, disrupting the trees ability to transport water and nutrients. As the larvae feed they create “S” shaped galleries. The larvae dig a pupal chamber in the fall where they over winter. Pupation occurs in late spring and the adults emerge through “D” shaped exit holes in May and early June. Adults remain active through the end of summer.



“D” exit holes

## Signs and Symptoms

New EAB infestations are difficult to detect and may not be seen for up to three years. Symptoms of an infestation include upper crown dieback, yellow leaves or sprouts that come directly out of the trunk, and vertical bark slits. EAB infestations can cause girdling and death of branches and entire trees. Girdling is damage to the tissues that carry food and water the entire way around the tree. Signs of an infestation can be recognized by identifying adult beetles or “D” shaped holes on the outside of the bark. Infestations can also be detected by identifying larvae or “S” shaped galleries beneath the bark. EAB larvae are creamy white and legless. Another sign of a potential infestation is excessive woodpecker activity. Several species of woodpeckers feed on EAB larvae and pupa, so finding an ash tree with large size or large quantities of woodpecker holes could mean that it is infested with EAB.



crown dieback



trunk sprouts



bark slits



woodpecker damage

## Asian Longhorned Beetle

### What is it?

The Asian longhorned beetle, also known as ALB, is another invasive bark-boring insect transported by firewood. The ALB is known to infest a wide range of host trees, including maples, elms, willows, birches, poplars, and ashes. This is one of the reasons why it is of such great concern and is so difficult to combat. ALB is an introduced species of beetle that is native to China. ALB first arrived in the United States in New York in 1996. The beetle arrived on solid wood packing material. It has since spread to several surrounding states, mostly by infested firewood, timber and nursery stock.



actual size adult ALB

Adult ALB are large beetles with bodies measuring 1 to 1.5 inches in length with long antennae. Their bodies are black with small white spots and their antennae are banded in black and white. The antennae are about 1.2 to 1.8 times its body length.

## Life Cycle and Damage

The ALB undergoes complete metamorphosis. Adults do little damage to trees. They feed on the midrib of leaves, on leaf petioles and on the thin bark of twigs before mating and laying eggs. The primary source of damage is ALB larvae. Females chew pits into the bark of a tree. They lay a single egg—about the size of a rice grain—under the bark. Females will lay eggs at multiple sites. One female is capable of laying up to 90 eggs. The egg hatches within two weeks and the white larva bores into the tree. The larva feeds on the living tissue that carries nutrients as well as the layer responsible for new growth under the bark. After several weeks, the larva tunnels into the heartwood, where it continues to feed and develop over winter. As the larvae feed, they form tunnels, or galleries, in tree trunks and branches. Larval tunnels can be found in broken branches of infested trees. After pupation occurs, adults chew their way out of the tree, leaving round exit holes approximately  $\frac{1}{4}$  to  $\frac{1}{2}$  inch in diameter.



round exit holes



larva galleries



larva



adult ALB



adult feeding

## Signs and Symptoms

New ALB infestations are difficult to detect and may not be seen for 3-4 years. Symptoms of an infestation include upper crown dieback and discolored leaves. Signs of an infestation can be recognized by identifying adult beetles or round exit holes on the outside of the bark. Infestations can also be detected by seeing oozing sap around pits chewed in the bark by females laying their eggs. Another sign of a potential infestation is an accumulation of frass at the base of an infested tree. Frass is a mixture of the solid feces of larva and wood shavings that result from feeding.



**crown dieback**



**egg pits**



**oozing sap**



**frass**

## Controls/Prevention

- **Leave firewood at home!** Don't bring it with you for camping or traveling.
- Buy firewood near your destination, buy only what you need, and burn it completely before leaving.
- Do not take wood collected in the forest home.
- If you have already brought wood with you, burn it all before leaving. Do not take it home and do not leave it for the next person.



# Gypsy Moth

## What is it?

The gypsy moth is an invasive forest pest that defoliates hundreds of acres of forests. It is one of the most damaging tree defoliators in the United States. Oak species top the list of over 500 tree species preferred by the gypsy moth. The gypsy moth is native to Europe and Asia. It was introduced to the United States in 1869 when a French entomologist imported moth eggs to Massachusetts with the idea of breeding a silk-spinning caterpillar that was more resistant to disease than the domesticated silkworm. Unfortunately, the caterpillars escaped into his backyard. About 10 years later, they began to appear in large swarms and, by the late 1880s, they were causing severe defoliation in the area. The invasive pest spreads when caterpillars move to new locations. They crawl to the tops of trees where they spin a silken thread and are caught on wind currents. Gypsy moths can also be spread by humans by hitchhiking to motorized vehicles and transporting firewood.



female gypsy moth with egg mass



gypsy moth larva

## Life Cycle and Damage

Gypsy moths undergo complete metamorphosis. The larval stage is the primary source of damage to trees. Adult moths emerge from the pupae in July and females begin to lay eggs in July and August. The eggs are enclosed together in a hairy brown mass, called an egg mass. Each female lays between 500-1000 eggs in sheltered areas such as underneath the bark of trees. When the gypsy moth larvae (caterpillars) emerge, they begin feeding on the leaves of their host tree. The caterpillars usually feed at night and rest during the day. However, when populations are very high, caterpillars will feed nonstop until the tree is completely bare and then look for a new food source. Caterpillars mature in mid-June or early July and go into the pupae stage. A tree can leaf out a second time in the summer but this decreases the energy stored in the tree. These weakened trees are more susceptible to other diseases. Trees that are defoliated two or more times in successive years will be killed by the constant stress and loss of energy reserves.

## Signs and Symptoms

Gypsy moth infestations can be identified by the presence of caterpillars. Caterpillars have five pairs of blue spots and six pairs of red spots on their back. They are about 2 inches long, dark colored and covered with hairs. Adult female moths can also be seen in the area. Female moths have whiteish wings and a tan body and do not fly. Egg masses can be found on trees, fence posts, outdoor furniture, cars and firewood in late summer.

## Controls/Prevention

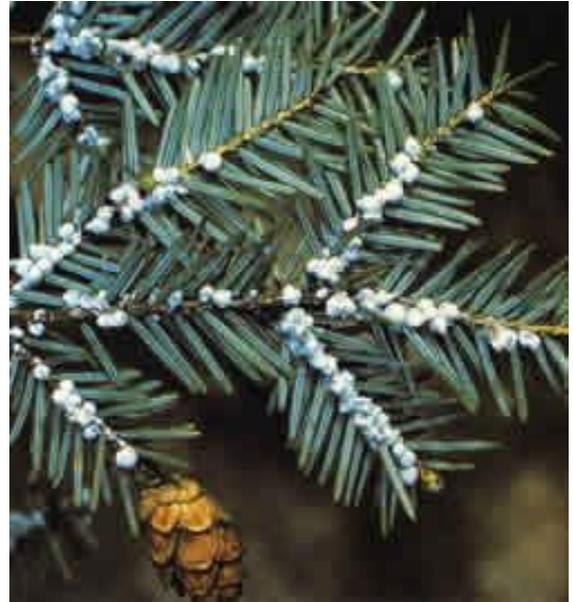
There are a variety of actions recommended to control gypsy moth populations on a single tree. Egg masses can be destroyed by soaking them in soapy water. Burlap placed around tree trunks will encourage larvae to hide there during the day. The larvae can then be killed. Barrier bands prevent larvae from climbing up the trunk. On a forest wide scale, pesticides can be effective in killing feeding larvae. Natural predators, including native birds and small mammals, prey on gypsy moth larvae and pupae. A predatory beetle has also been introduced to eat the larvae and pupae. To prevent the spread of gypsy moths, it is important to check vehicles before leaving infested areas and not transporting firewood.

# Hemlock Woolly Adelgid

## What is it?

The hemlock woolly adelgid is a serious threat to our state tree, the Eastern hemlock. The hemlock woolly adelgid is an invasive, aphid-like insect that attacks North American hemlocks. The hemlock woolly adelgid was accidentally introduced to Virginia from Japan in the 1950s. By the late 1960s, it was reported in southeastern Pennsylvania. The insects can be carried by birds and can be moved on hemlock nursery trees, logs or firewood.

white, waxy egg masses



## Life Cycle and Damage

The hemlock woolly adelgid undergoes incomplete metamorphosis. The nymph stage is the primary source of damage to the tree. Adult adelgids are black, oval, soft-bodied, and about 2 mm long. They are very small and hard to see, but they can be easily identified by the white waxy masses they form on the underside of branches at the base of the needles. These masses can contain up to 200 eggs and remain present throughout the year. Once hatched, adelgid nymphs, known as crawlers, crawl onto branches to feed, usually at the base of the needles. The hemlock woolly adelgid is a type of sapsucking insect pest. The nymphs insert their piercing-sucking mouthparts into the base of the needles and remove plant fluids. They remain in the same spot, continually feeding until they develop into adults. Their feeding severely damages the canopy of the host tree by disrupting the flow of nutrients to its twigs and needles. Trees typically die within 4 to 10 years.

## Signs and Symptoms

A hemlock woolly adelgid infestation can be identified by the presence of the white waxy egg masses on the underside of branches at the base of needles. Because the nymph feeding interferes with the tree's use of nutrients, the tree can experience needle loss and branch dieback.



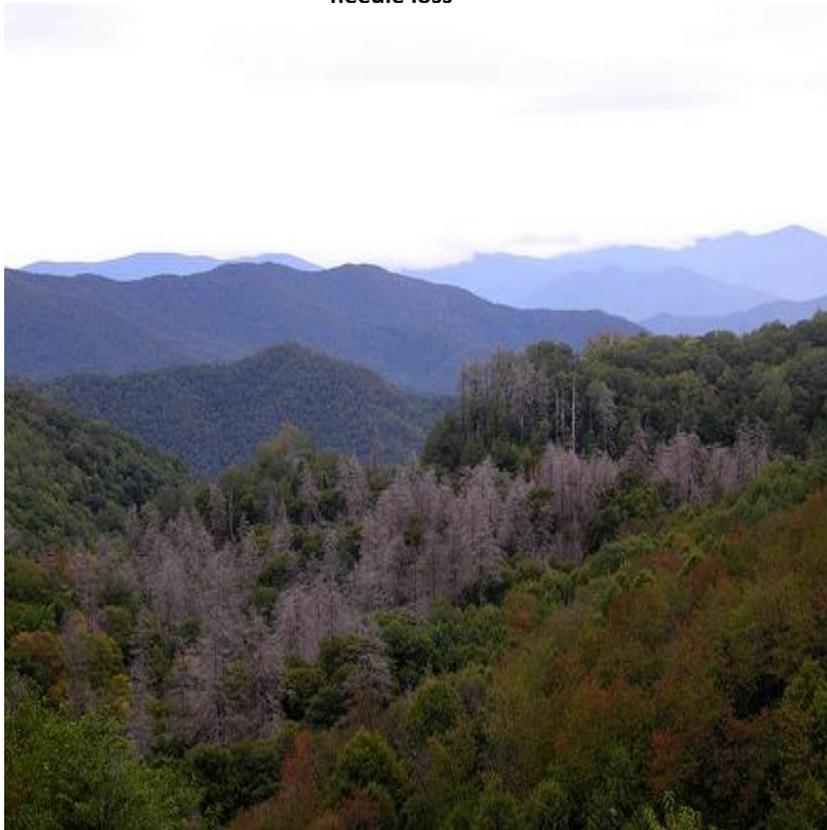
magnified adult, eggs, and crawler

## Controls/Prevention

The adult hemlock woolly adelgid can be controlled by applying insecticides in the fall. Insecticides applied in the spring targets feeding nymphs. Insecticides injected into the soil are taken up by the tree roots and also kill feeding nymphs. The Bureau of Forestry has been introducing several different predatory beetles that feed solely on hemlock woolly adelgid which has reduced the impact of the insect. The U.S. Forest Service, along with other agencies and several universities, are working to find and develop hemlock trees that are resistant to the hemlock woolly adelgid. To prevent the spread, do not transport firewood.



needle loss



dead eastern hemlocks

# Bush Honeysuckle

## *Lonicera* species

### Identification Features:

- Upright multi-stemmed SHRUB.
- OPPOSITE branching pattern.
- SIMPLE, OVAL shaped leaves. Leaves have a sharp pointed tip. ENTIRE margins. Underside of leaves are fuzzy.
- Stems of mature plants are hollow,
- Tubular fragrant flowers bloom in spring. Flowers are pink or yellowish-white depending on the species.
- Fruits are red or orange BERRIES that ripen in August.
- Reaches heights up to 16 feet tall.



**LEAVES**

### Habitat:

- INTRODUCED & INVASIVE to Pennsylvania.
- Abandoned fields, along roadsides, near marshes, and in recently disturbed woodlots.



**FLOWERS**

### Where did it come from?

Bush honeysuckles are native to Europe and Asia. Bush honeysuckles were introduced to the United States in the 1800's as ornamentals. They were also planted for wildlife food and cover. The two species commonly found in Pennsylvania are Tartarian honeysuckle (*Lonicera tatarica*) and Morrow's honeysuckle (*Lonicera morrowii*).

### How does it spread?

Bush honeysuckles compete with many native plant species for natural habitats. Honeysuckles grow in a wide range of habitats and tolerate varying moisture conditions. Birds feed on honeysuckle berries spreading the seeds. Seeds can remain viable in the soil for several years.



**STEM**



**FRUIT**

## **How can it be controlled?**

Bush honeysuckle can be cleared by hand pulling because of its shallow root system. Make sure to remove all the roots, because new sprouts will grow from the root system. For severe infestations, cutting them in early spring and late fall for several years will eventually kill the honeysuckle by reducing the plant's reserve nutrients. Do not cut the bushes in the winter because this will cause the plant to re-sprout vigorously. Applying an herbicide to the leaves or a freshly cut stump late in the growing season will also help control bush honeysuckles.

## **Native alternatives:**

flowering dogwood  
witch hazel  
spice bush  
sassafras



# Callery Pear

## *Pyrus calleryana*

### LEAF

#### Identification Features:

- ALTERNATE branching pattern.
- SIMPLE, glossy leaves. OVATE shaped. Finely TOOTHED margins.
- Showy white flowers bloom prior to bud break in the spring. Unpleasant smelling.
- Fruit is a round, pinkish brown POME. Pome fruits have a "core" of several small seeds, surrounded by a tough membrane.
- Tree reaches heights of 50 feet tall.



#### Habitat:

- INTRODUCED & INVASIVE to Pennsylvania.
- Found in parks, disturbed woods and roadsides.

#### Where did it come from?

The callery pear is native to China, Japan, Korea, Taiwan, and Vietnam. It was introduced to the United States in 1917 for hybridization experiments to improve disease resistance of the common fruiting pear. In the 1950's, the cultivar "Bradford" was developed and became popular for ornamental planting. This is also where it's other name, Bradford pear, originates. Since then, many other cultivars were developed with slightly different characteristics; all contribute to the species' invasiveness.

#### How does it spread?

The callery pear grows rapidly and produces large amounts of seeds. The callery pear spreads mostly by seed. European starlings and American robins eat the small pears and spread the seeds. Each pear contains 2-6 seeds. The tree can also root sprout, if injured or cut. Callery pear is adapted to a wide variety of environmental conditions including heavy clay soils, drought, heat and pollution and can form dense thickets that push out other plants including native species.

### FLOWERS



### POMES



## How can it be controlled?

Complete removal of the tree is the best control. Large trees should be cut, with an immediate herbicide application to the stump. Seedlings can be pulled or dug out.

## Native alternatives:

serviceberry

hawthorn

redbud

flowering dogwood

spicebush



# Mile-a-Minute

## *Persicaria perfoliata*

### Identification Features:

- Herbaceous annual VINE.
- ALTERNATE branching pattern.
- SIMPLE, TRIANGLE shaped leaves. Leaves light green in color. Undersides of leaves contain barbs.
- Stems are reddish in color and contain downward facing barbs or prickles.
- Round leaf-like structures called ocreae surround the stem.
- Clusters of small white, rather inconspicuous, flowers emerge from the ocreae.
- Fruits are berry-like and turn bright blue in mid-summer. Each fruit contains a single black or reddish-black hard seed, called an ACHENE.
- Vine can grow as much as 6 inches per day and can reach heights of more than 25 feet within a single growing season.



**LEAVES**

### Habitat:

- INTRODUCED & INVASIVE to Pennsylvania.
- Found along forest edges, wetlands, roadsides and forest clearings.



**ORCEAE**

### Where did it come from?

Mile-a-minute, also known as devil's tail tearthumb, is native to Asia. It was first introduced into the United States in the 1930's at a nursery in York County, Pennsylvania where seeds were spread with rhododendron stock. Since then it has spread out to neighboring states.

### How does it spread?

As its name implies, mile-a-minute spreads very rapidly in sunny areas. The vine can grow as much as 6 inches a day and can reach heights of more than 25 feet within the growing season. Its prickly stems and leaves allow it to climb over surrounding vegetation and form dense, tangled mats that shade out and choke underlying vegetation. Seeds are dispersed by birds and mammals which eat the fruit. Floodwaters facilitate long distance dispersal of seeds. Seeds are also dispersed by moving contaminated soil and as hitchhikers on clothes, shoes and equipment. Seeds can survive in the soil for 7 years.



**FRUIT**



**BARBS**

## How can it be controlled?

Vines can be hand-pulled but thick gloves should be worn. Removal should be done prior to fruit formation. Repeated mowing will prevent the plant from flowering and reduce fruit production. Herbicides may be used as an alternative in heavily infested areas. To be safe and effective, herbicide use requires knowledge of the chemicals and their appropriate concentrations as well as understanding of the method and timing of their application. Also, a biological control is currently being tested. A weevil, *Rhinocominus latipes*, is being used on various test plots in Pennsylvania and elsewhere to control mile-a-minute. These small insects feed on the leaves and bore into the stems. While they will not eliminate the plant, they help keep it in check and reduce fruit production.

## Native alternatives:

virgin's bower  
trumpet honeysuckle  
Virginia creeper



# Multiflora Rose

## *Rosa multiflora*

### Identification Features:

- SHRUB
- ALTERNATE branching pattern.
- PINNATELY COMPOUND leaves with 5–11 OVAL shaped and TOOTHED leaflets. Leaves have a feathery stipule (leaflike structure) at the base of the petiole.
- Flowers are white and found only at the end of branches. Blooms in June.
- Fruits are red HIPS that ripen in August.
- Twigs are thorned arching stems. Layering occurs when branches come in contact with the ground and take root. The thorns point downward.
- Shrub can reach 10 feet tall.



**LEAF**

### Habitat:

- INTRODUCED & INVASIVE to Pennsylvania.
- Found along forest edges, in open fields, or in fencerows.

### Where did it come from?

Multiflora rose is an introduced species that is native to Japan and Korea and was introduced to the U.S. in the 1860s. It was originally planted as an ornamental shrub. In the 1930s, conservation agencies began to promote it as a wildlife food and a cover plant for animal habitats. It was also used for erosion control and as living fences to confine livestock. Since its introduction, multiflora rose has spread rapidly from cultivation and readily invades open woodlands, forest edges, open fields, stream banks and other areas that have been subjected to land disturbance.

### How does it spread?

Multiflora rose is spread by seeds and by suckering. Birds eat and disperse the seeds which are the primary means by which the shrub moves to new areas. An average plant may produce a million seeds per year. These seeds may sprout for up to 20 years. Suckering occurs both when the tips of arching stems root where they contact the ground and also when roots sprout new growth. Reproduction by suckering allows the plant to form dense, impassable thickets. Multiflora rose has a wide tolerance for soil, moisture and light conditions allowing it to spread to many habitats.



**FLOWERS**



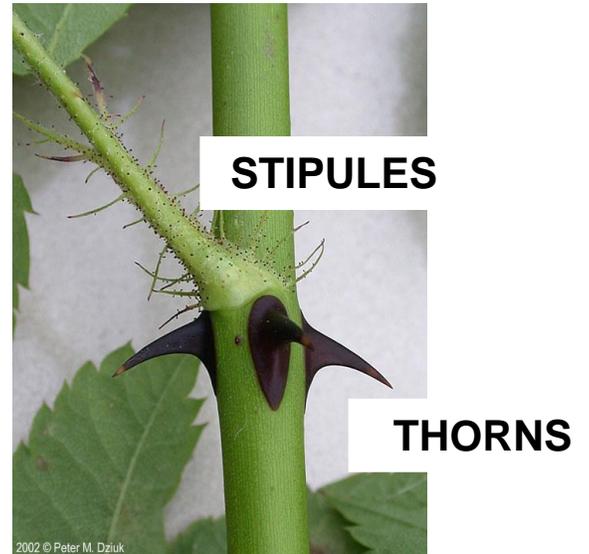
**HIPS**

## How can it be controlled?

Regular mowing and repeated cutting in grassy areas inhibit seedling establishment. Shrubs can be removed by digging and pulling. This is only effective when all of the roots are removed. Treatments with certain herbicides have also been effective at controlling the plant. Repeated treatments are needed because the seeds remain viable in the soil for many years. Also, two biological controls have been used successfully to manage the spread of multiflora rose. One is a native fungal pathogen (rose-rosette disease) that is spread by a tiny native mite. The second is a non-native seed-infesting wasp, the European rose chalcid.

## Native alternatives:

- common blackberry
- flowering raspberry
- pasture rose
- swamp rose
- witch hazel
- spicebush



# Norway Maple

## *Acer platanoides*



### Identification Features:

- OPPOSITE branching pattern.
- SIMPLE leaves with 5 lobes. Milky sap exudes from broken leaf stalk.
- Fruits are SAMARAS with the wings wide spreading to nearly horizontal. Maturing in autumn.
- Tree reaches heights of 50 feet tall.

### Habitat:

- INTRODUCED & INVASIVE to Pennsylvania.
- Found along city streets and in parks, disturbed woods and roadsides.

### Where did it come from?

Norway maple is an introduced species that is native to Eurasia from southern Scandinavia to Iran. It was introduced in Philadelphia in 1776 by a botanist as an ornamental shade tree. It was frequently planted in neighborhoods during the 1950's to replace native American elms that were killed by the Dutch elm disease.

### How does it spread?

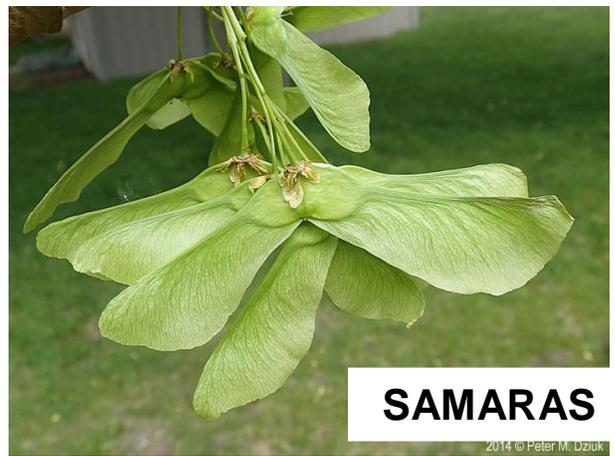
The seeds (samaras) are spread by the wind. Norway maples out-compete native maples, even in shady conditions.

### How can it be controlled?

Seedlings can be hand pulled when the ground is wet or dug out. Larger trees can be cut close to the ground.

### Native alternatives:

red maple  
American beech  
sweet gum  
black gum



# Oriental Bittersweet

## *Celastrus orbiculatus*

### Identification Features:

- Woody, perennial VINE.
- ALTERNATE branching pattern.
- SIMPLE, OVAL to ROUND glossy leaves. Leaves with rounded TEETH.
- Stem furrowed and brown with noticeable lenticels.
- Surface of roots is bright orange.
- Small greenish flowers that grow in clusters along the stem. Flowers bloom in spring.
- Round green fruits that, when ripe, turn yellow and split open to reveal three orange-red arils containing the seeds. Fruits ripen in autumn and remain on the vine through winter. (An aril is a covering over a seed).
- Vine can grow to 5 inches in diameter and up to 66 feet long.



**LEAF**

### Habitat:

- INTRODUCED & INVASIVE to Pennsylvania.
- Woodlands, fields and streams.

### Where did it come from?

Oriental bittersweet is native to Asia. It was brought to the United States in the mid 1800's. It was used as an ornamental and has escaped cultivation. The fruiting stems are frequently used in fall decorations.



**FRUITS**

### How does it spread?

Oriental bittersweet can overrun natural vegetation. It strangles shrubs and small trees, can weaken mature trees by girdling\* the trunk, and can weigh trees down breaking the tree tops. It also, blocks sunlight from native species and competes with natives for water and nutrients from the soil. A typical female plant can produce up to 370 fruits. Oriental bittersweet can be spread by birds and mammals that feed on the fruits, and then drop the seeds in their scat. People also move the seeds by using fruiting stems in flower arrangements and then carelessly discarding them. Additionally, roots can spread and send up new plants.

\*Girdling is when something is tightly wrapped around the tree and can potentially kill the tree.



**STEM**

## How can it be controlled?

Oriental bittersweet vines can be pulled out by the root. Be sure to remove all the root or the vine will re-sprout. If there are any fruits present, they should be bagged and disposed of. Herbicides applied to cut stems have been successful. Do not use Oriental bittersweet stems in decorations.

## Native alternatives:

Virgin's bower  
Trumpet honeysuckle  
Virginia creeper



# Tree of Heaven

## *Ailanthus altissima*

### Identification Features:

- ALTERNATE branching pattern.
- PINNATELY COMPOUND leaves with ELLIPTICAL shaped leaflets. Leaves have 11-41 leaflets. Lower leaflets often are TOOTHED at the base.
- Fruits are SAMARAS that occur in summer through autumn. Samaras are flat, twisted, and papery structures which occur in large clusters. The fruits are tan to pink in color and have a single, flattened seed in the center.
- Twigs have a rank odor when broken.
- Tree reaches heights up to 90 feet tall.



### Habitat:

- INTRODUCED & INVASIVE to Pennsylvania.
- Disturbed woods, roadsides, vacant lots and railroad banks.



### Where did it come from?

Tree of heaven is an introduced species that is native to central China. It was introduced to the U.S. in 1784 by a Philadelphia, PA gardener. By 1840 it was commonly available from nurseries. Since its introduction, tree of heaven has sprouted up just about anywhere including alleys, sidewalks, parking lots, streets as well as in fields, roadsides, fencerows, woodland edges and forest openings.

### How does it spread?

Tree of heaven spreads by seeds and suckering. Suckering occurs when cut stumps and root fragments re-sprout. A single tree can produce up to 325,000 seeds per year. The seeds are very light in weight and can easily be transported by wind. Wind can blow samaras onto clothing, gear or cars of a hiker or biker. If the person is not careful to clean off these items, they can easily "hitchhike" their way to new locations. Once established, it grows rapidly and forms dense stands that displace native plants. Tree of heaven also produces chemicals that kill or prevent other plants from growing near it.



**SAMARAS**

### **How can it be controlled?**

Seedlings can be pulled or dug up. Care must be taken to remove the entire plant including all roots and fragments to prevent re-sprouting. Several herbicides have also proven to be effective in controlling tree of heaven. Targeting the removal of large female trees is the best way to control their spread because female trees are responsible for seed production. Before any control measures are used, it is important to correctly identify the plant because some native species are often confused with tree of heaven.

### **Native alternatives:**

box elder  
smooth sumac  
staghorn sumac  
black walnut  
white ash  
tulip tree

