Asian Longhorned Beetle and its Host Trees

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Asian Longhorned Beetle and its Host Trees

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Table of Contents

Adult Asian longhorned beetle.

Introduction

The Asian longhorned beetle (*Anoplophora glabripennis*) has been devastating urban forests in the Northeast since it was first detected in New York City in 1996. Efforts to eradicate this pest have resulted in the removal of tens of thousands of trees in several northeastern communities in the United States and Canada (map 1).

The Asian longhorned beetle has been successfully eradicated from Illinois and several areas of New York and New Jersey. While the eradication battle continues on several other urban fronts, there are growing concerns that this invasive pest could enter natural and managed forests of Eastern North America.

This pictorial guide provides basic information for identifying the Asian longhorned beetle, its injury characteristics, and its common host trees. The guide will help users detect the beetle in both urban and forested settings.

Photo: Patty Douglass, USDA APHIS

Removal of an Asian longhorned beetle-infested tree in Massachusetts.


Map 1. Asian Longhorned Beetle Infestations in North America
(as of July 2012)
Ontario, Canada
First detected in
Toronto in 2003
Massachusetts
First detected in
Worcester in 2008
New York
First detected in
Brooklyn in 1996
New Jersey
First detected in
Jersey City in 2002
Illinois
First detected in
Chicago in 1998
Declared eradicated in 2008
Ohio
First detected in
Tate Township
on June 17, 2011
Map Key
Maple Forests*
ALB Infestations
* Preferred ALB Host. (USFS FHTET, 2012; Yemshanov et al. 2012)
N
W
E
S
0
100
200 Miles

Closeup of adult beetle showing small hairs on the legs and tarsi.
Photo: Jennifer Forman-Orth

Description of the Asian Longhorned Beetle

The adult Asian longhorned beetle is a large, “showy” insect that can only be seen from late spring to fall. Detection of the beetle often depends on the ability to identify the signs of injury left by each stage of the insect’s development in or on trees, some of which can be seen throughout the year. This section provides an overview of the insect’s life cycle and descriptions of the signs of damage left behind on trees.


Photo: Connecticut Agricultural Experiment Station


Photo: Melody Keena

Male Asian longhorned beetles have long antennae (left); antennae on females are approximately the same length as the body (right).

Adults

Adults are glossy black with irregular white spots on the wing covers. Body size ranges from ¾ to 1¼ inches in length, not including the very long black and white antennae. Freshly emerged adults often have a bluish tinge in the form of small hairs, especially prevalent on the legs. Adults are visible between late spring and the first hard frost in the fall, and are often in the tree canopy.

Male adult beetle.

Beetles mating on the limb of a sugar maple.

Anoplophora glabripennis form *nobilis*


Photo: Michael Bohne


Photo: Michael Smith, USDA Agricultural Research Service

A form of the Asian longhorned beetle with yellowish spots (*A. glabripennis* form *nobilis*) has been detected in some North American infestations, but it is generally rare.

Common Asian Longhorned Beetle "Look-alikes"

These insects are commonly found in North America and are often misidentified as the Asian longhorned beetle

(all insect images are actual size).

The **whitespotted pine sawyer** is a wood borer of conifer trees. Adults have a characteristic single white spot at the base of the wing covers and are often reported as Asian longhorned beetle in the spring/summer.

The **western conifer seed bug** feeds on conifer seeds and can be found inside buildings during the onset of cold weather in the fall. Adults have a flattened, leaf-like expansion on the hind legs. Adults will give off a foul odor when handled.

The western conifer seed bug is commonly reported as Asian longhorned beetle in the fall.

The **broadneck root borer** feeds on roots of hardwood trees. Adults are visible from May through June and have no white markings.

The **eyed elater** is one of the largest species of click beetles, reaching over 1.5 inches long. This beetle is a predator of many wood-boring insects of hardwood trees. Adults have a salt and pepper-like appearance with two large false eyespots on the top of the pronotum (neck).

Photos: Michael Bohne

Egg Sites

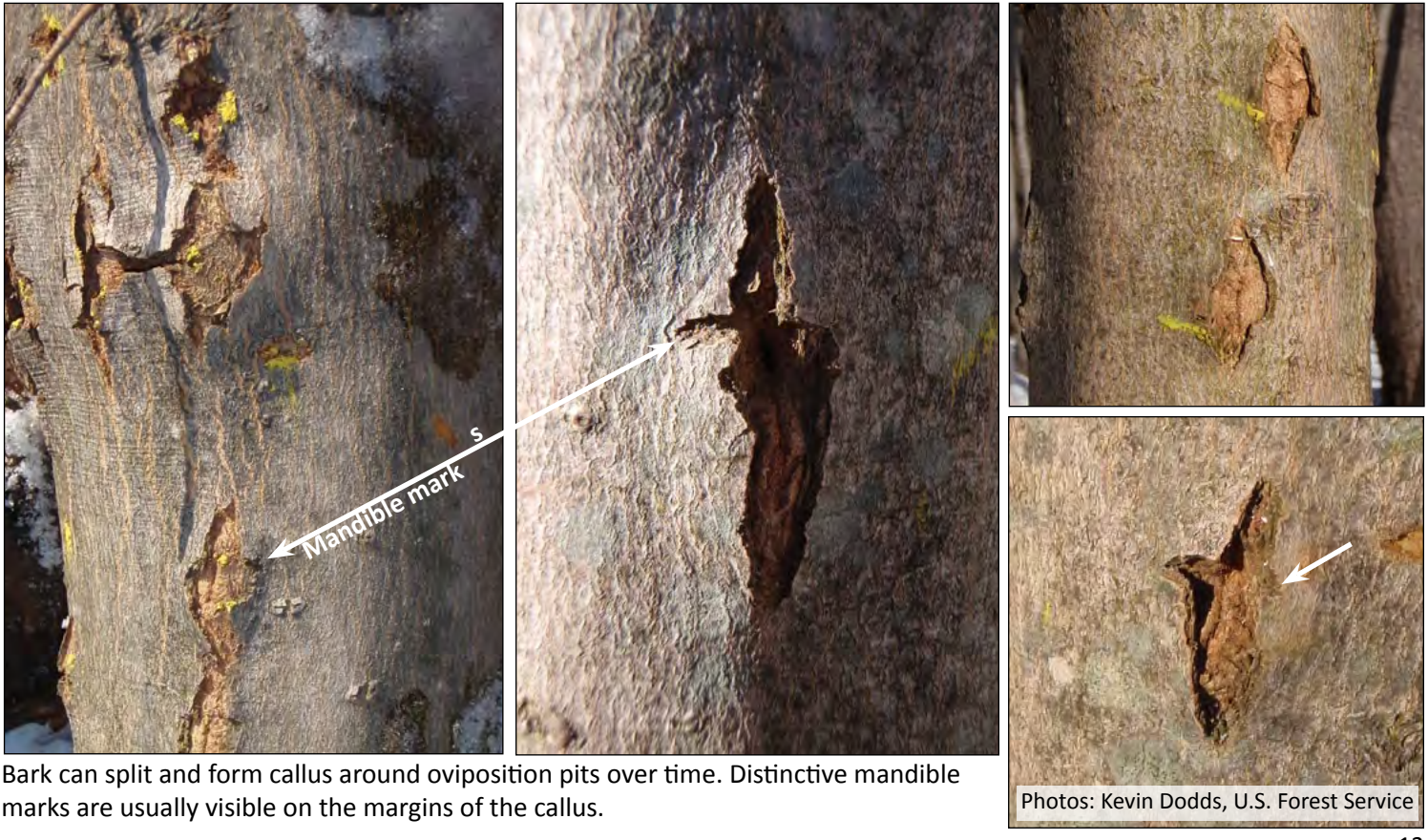
Egg laying begins soon after adults emerge in mid-summer. Adult females chew an egg site, or "oviposition pit," for every egg they lay on a tree. The shape of the pits will vary based on the thickness of the outer bark, ranging from circular, to oval, to just a slit on thin-barked trees. Mandible (teeth) marks are often visible on the outer edges of the oviposition pit. The color of the pit depends on the host tree and age of the pit. Generally, freshly chewed pits are easier to see because the inner bark contrasts with the outer bark. The pit color fades to a similar color as the undamaged outer bark with age. Bark splits and callus form around the pits over time; however, pits can still be identified for several years with careful inspection.

Fresh egg sites on a downed red maple branch.

Closeup of an old (left) and fresh (right) oviposition pit.

Closeup of oviposition pits showing mandible marks on the margin of the pits (indicated with white arrows).

Heavily attacked trees showing fresh and old oviposition pits.
Left: paper birch in the United States; center: sugar maple in the United States; right: hybrid poplar in China.



Bark can split and form callus around oviposition pits over time. Distinctive mandible marks are usually visible on the margins of the callus.

Photos: Kevin Dodds, U.S. Forest Service

Eggs

Once the pit is chewed, the female inserts her ovipositor and lays the egg between the bark and phloem of the tree, creating an oval stain. The egg is roughly the size of a grain of rice, milky white, and flat, like the seed of a cucumber. Yellowing as it matures, the egg typically hatches 10-15 days after it is laid. The egg and stain are only visible when the bark is peeled back. Females sometimes chew a pit without depositing an egg.

Two eggs removed from the host tree.

Egg and stain made visible after the bark was removed at the oviposition site with an arch punch.

Early Stage Larvae

Newly hatched Asian longhorned beetle larvae feed on the phloem and outer sapwood of the tree for the first couple of larval stages. This early feeding produces sawdust/excrement (frass) and creates small tunnels leading away from the egg site. The frass and tunneling are only visible when the bark is removed from around the oviposition pit.

Early larval feeding on the phloem made visible after bark removal at the oviposition site.

Late Stage Larvae and Pupae

Late stage larvae turn and tunnel into the sapwood, creating an oval sapwood entrance hole. The legless larvae can reach 2½ inches in length and are creamy white in color, with a brown hardened "plate" on the first segment of the dorsal side of the thorax (neck). Late stage larvae feed on the sapwood of the tree, creating long tunnels within the tree. In some cases, larvae return to the outer sapwood, creating larger tunnels that are visible if the bark is removed. Frass from larval feeding may protrude from the egg sites or from cracks in the bark. Once feeding is complete, the larva chews a chamber where pupation occurs. The internal larval tunneling and pupal chambers are only visible when the tree is completely dissected.

Bark removal at the oviposition site reveals a sapwood entrance hole of a late stage larva.

Various late stage larvae.

Pupa.

Cross section showing an adult beetle exiting the tree after pupation.

Tabletop display showing internal damage caused by Asian longhorned beetle development within the tree.

Maple split open to expose internal damage caused by Asian longhorned beetle development within the tree.

Photo: Tom Denholm, USDA APHIS

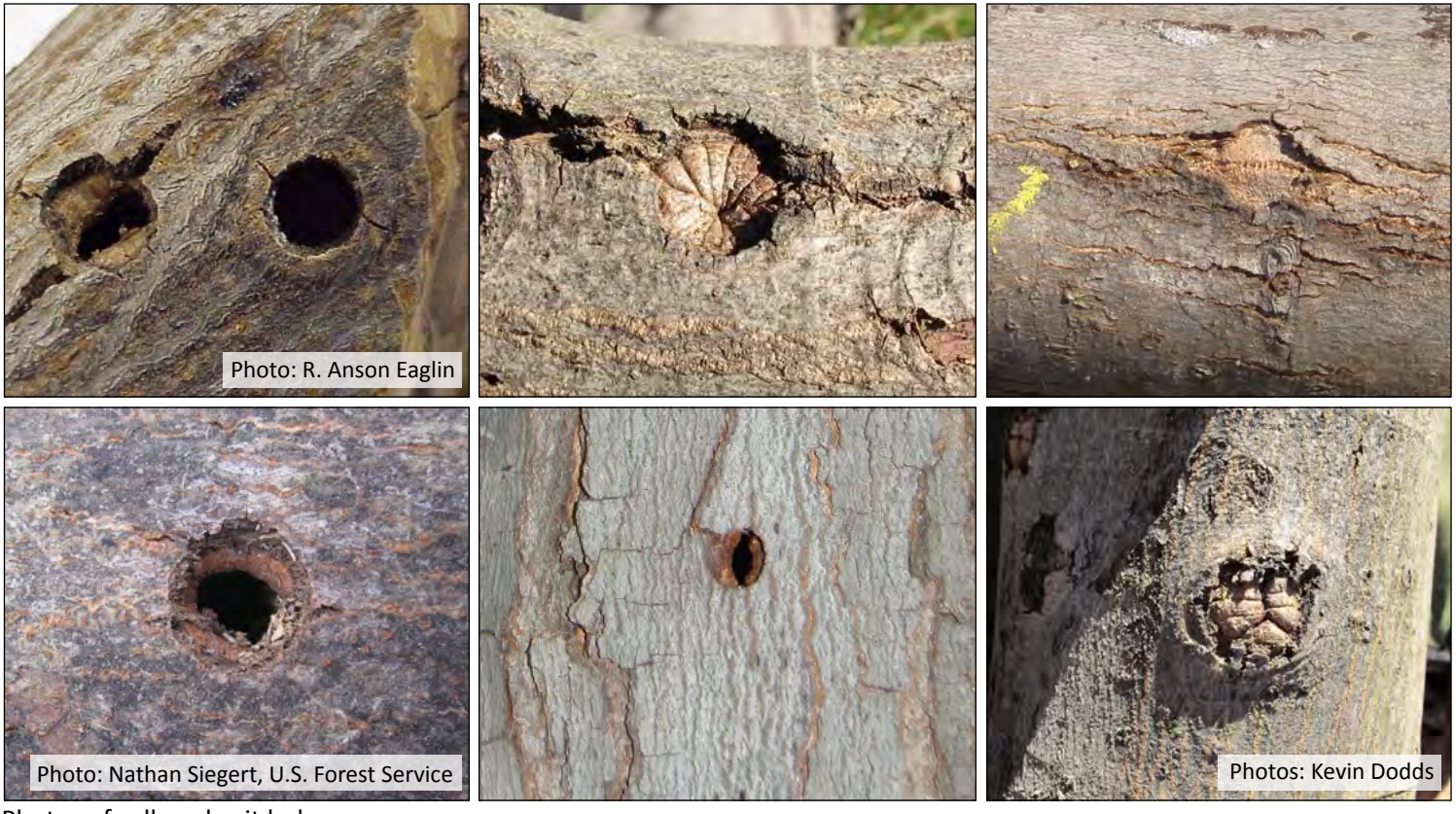
Exit Holes

After pupation the new adult beetles begin to tunnel out of the tree, creating perfectly round exit holes. The holes vary in size and are generally slightly smaller than a dime, but large enough to fit the eraser end of a common pencil. The complete life cycle of the Asian longhorned beetle, from egg to mature adult, can take 1 to 2 years depending on climate. Exit holes are visible on the tree for several years and will callus over in time. Callused exit holes are more difficult to see on the tree, but can usually be located with careful examination.

Exit hole on the limb of a birch tree.

Fresh exit holes and old egg sites on maple.

Exit holes on dead maple trees.



Photos of callused exit holes.

Frass

Frass from larval feeding will protrude from the egg sites or bark cracks and will often collect in branch crotches or at the base of the tree.

Maturation Feeding

After emerging from the tree, adult Asian longhorned beetles disperse, feeding on leaves and the bark of young twigs before seeking a mate. This maturation feeding causes distinct injury along the veins of leaves that can be used to help detect the insect. Leaves attached to trees and sometimes those on the ground show the signs of adult feeding. Maturation feeding on leaves is easy to detect by looking straight up into the tree canopy.

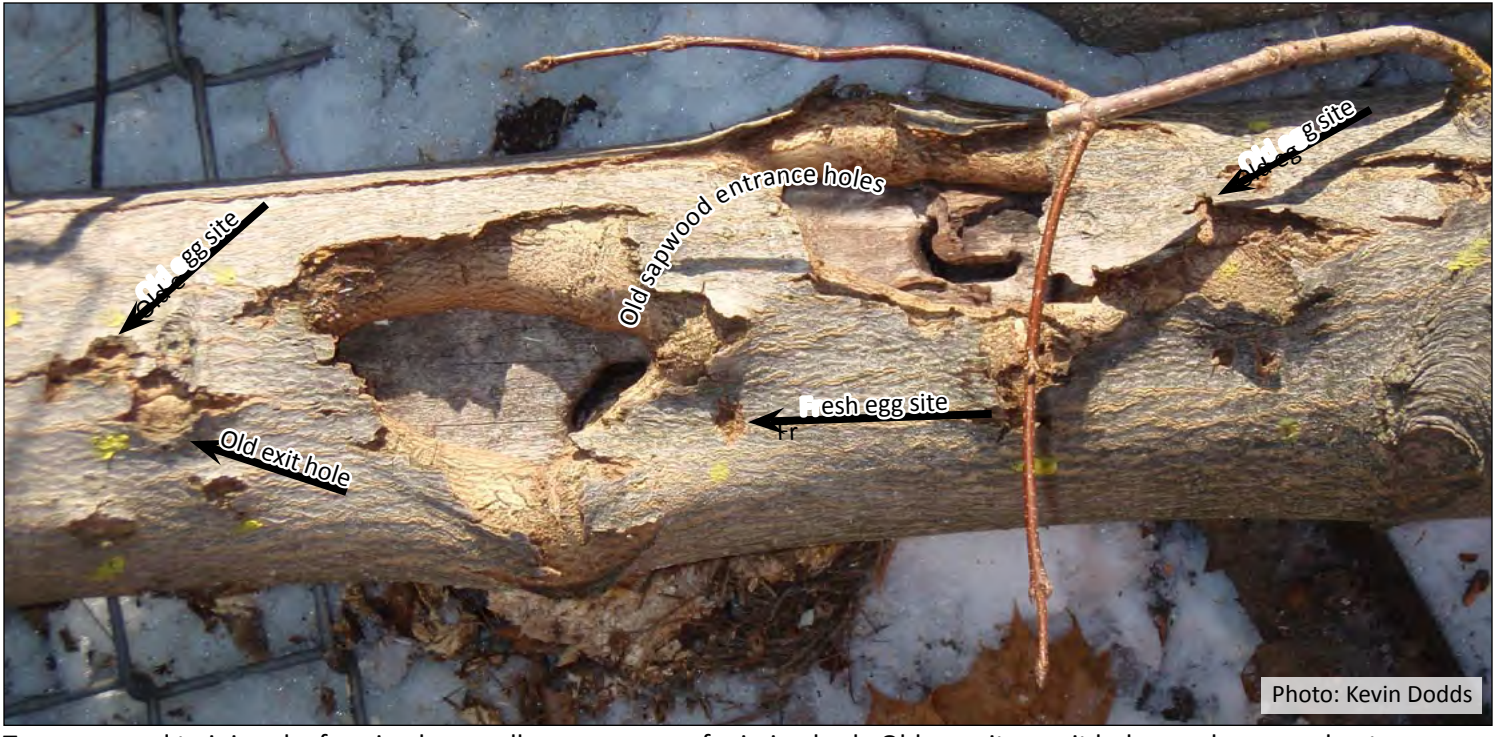
Maturation feeding on leaves and twigs by adult Asian longhorned beetles.

Other Signs of Asian Longhorned Beetle Infestation

Tunneling from beetle development greatly weakens the structure of the tree, which can result in breakage of the limbs, crown, or bole.

Trees stressed by Asian longhorned beetle infestation may show early fall coloration. This infested sugar maple started to show fall color in early August.

Sap exudes from oviposition pits chewed in early summer, which can attract other insects such as beetles, bees, wasps, and flies.



Trees respond to injury by forming large calluses or areas of missing bark. Old egg sites, exit holes, and sapwood entrance holes are usually visible upon closer inspection.

Asian Longhorned Beetle in Urban Communities

All six unique North American populations of the Asian longhorned beetle began in urban areas with industries involved in importing. Subsequent satellite populations have often been attributed to movement of infested material.

These urban populations of the Asian longhorned beetle tend to disperse slowly. Infestations usually begin in the crown of the tree. Adults often re-infest the same host tree from which they emerged. Injury can often be seen on the lower bole and exposed roots of these heavily infested trees. The tremendous buildup of an infestation can go on for years and eventually kill the tree or weaken it to a point where structural failure occurs.

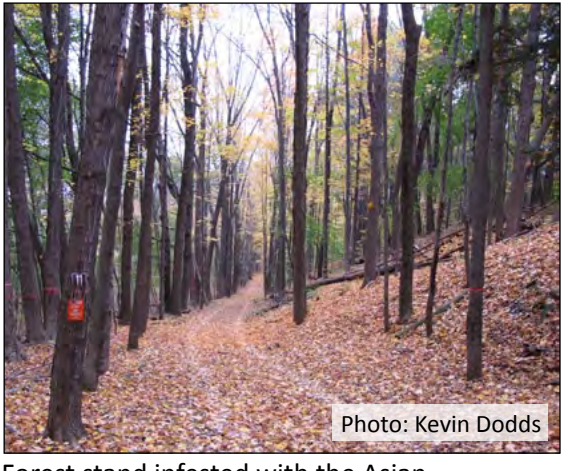
When developing survey strategies in urban areas, prioritize efforts and focus on areas of industry where there is known import/export activity that involves wooden pallets, spools, crates, or other wood packaging materials. Also focus on municipal collection yards where there is disposal of tree waste and/or solid wood packing material.

Surveyors inspect an infested maple with a local resident in Worcester, MA.

Asian Longhorned Beetle in Forests

Until recently, Asian longhorned beetle infestations in North America were limited to urban environments that were relatively isolated from natural or managed forests. Unfortunately in Massachusetts and Ohio, the beetle has successfully migrated into and infested closed-canopy forests. Observations made in some of these stands showed unique infestation patterns and damage indicators.

- In New England forests, Asian longhorned beetles were found only in maple, even though other host genera were present.
- The beetle attacked larger trees more often than smaller, overtopped trees.
- The beetle was readily dispersed throughout the forest, attacking trees in the interior of stands.
- The beetle attacked red maple more often than other maple species when multiple maple species were present.
- The beetle killed few trees outright; however, trees had serious damage along their boles and in their crowns, and were considered likely to succumb to structural failure.
- Signs of infestation were observed more readily in tree crowns.



Forest stand infested with the Asian longhorned beetle.

When developing survey strategies in forested areas, prioritize efforts and focus on the upper boles and crowns of large, dominant trees that are preferred host genera of Asian longhorned beetle (p. 26), especially maple if present. Pay close attention to trees with signs of structural failure and survey throughout the stand.

Host Trees

The 13 host genera highlighted in this guide were selected based on current literature, host suitability studies in China and the United States, and host abundance data acquired from the Asian longhorned beetle eradication programs in North America.

Preferred Host Trees

Rare Host Trees

NOTE: The species listed here are common representatives of Asian longhorned beetle host trees. Other species may be potential hosts.

BOX ELDER

Acer negundo L.

Leaves

- Opposite, 3-7 leaflets arranged in two rows along an axis (leaf stalk)
- Coarsely saw toothed
- 2.0-4.8” long

Twigs

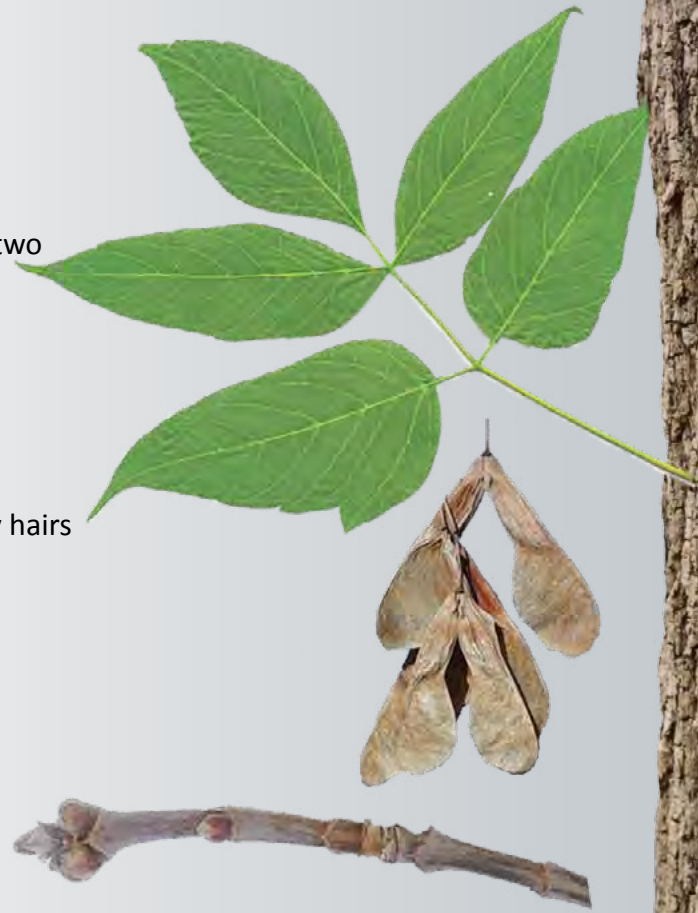
- Purplish green to brown
- Waxy film on new growth
- Buds greenish to reddish with silky hairs

Fruit

- Samara, matures in autumn
- Approximately 1.5” long
- V-shaped wings when paired
- Appears in dense clusters

Bark

- Gray brown, ridges and furrows



BLACK MAPLE

Acer nigrum Michx. f.

Leaves

- Opposite, simple
- 3-5 shallow lobes
- Edge smooth between points

Twigs

- Brown, shiny, smooth
- Similar to sugar maple; however, older twigs have waxy coating
- Buds dark brown, cone shaped, sharply pointed

Fruit

- Samara, matures in autumn
- U-shaped wings when paired
- Approximately 1” long

Bark

- Gray brown
- Becomes deeply furrowed with age

SYCAMORE MAPLE

Acer pseudoplatanus L.

Leaves

- Opposite, simple, 3-5 lobes
- Dark green above, greenish white beneath
- 2.4-5.5” long

Twigs

- Smooth, gray brown
- Slightly 4 sided
- Buds are greenish and slightly pointed

Fruit

- Samara, matures in autumn
- 1.25-2” long, U shaped when paired

Bark

- Grayish, reddish brown to orangish
- Irregular, rectangular scales

RED MAPLE

Acer rubrum L.

Leaves

- Opposite, simple, 3 (occasionally 5) lobes
- Medium green above, silvery beneath
- Leaf stalks often red, 2-6” long

Twigs

- Greenish red brown, smooth, shiny
- Buds reddish green, blunt
- Red flower buds in clusters

Fruit

- Samara, matures in late spring
- Green, becoming red
- Approximately 0.75” long

Bark

- Dark gray, rough
- Scaly, ridged, furrowed

SILVER MAPLE

Acer saccharinum L.

Leaves

- Opposite, simple, 5 lobes
- Deep sinuses, sharply pointed lobes
- Bright green above, silvery white beneath
- 5.5-7.9” long

Twigs

- Red to brown, smooth, shiny
- Buds reddish brown
- Flower buds often in dense, compact clusters

Fruit

- Samara, matures in late spring
- 1.5-2” long, wings widely divergent when paired

Bark

- Gray to gray brown, scaly, ridged, furrowed

SUGAR MAPLE

Acer saccharum Marsh.

Leaves

- Opposite, simple
- Usually 5 lobes, rarely 3
- Edge entire or sparingly wavy toothed
- 3-8” long

Twigs

- Brown, shiny, smooth
- Buds gray brown, cone shaped, sharply pointed

Fruit

- Samara, matures in autumn
- U-shaped wings when paired
- Approximately 1” long

Bark

- Gray brown
- Becomes deeply furrowed with age

NORWAY MAPLE

Acer platanoides L.

Leaves

- Opposite, simple, 5 lobes
- Lustrous dark green
- Milky sap visible when leaf stalk broken from twig
- 3.2-6.3” long

Twigs

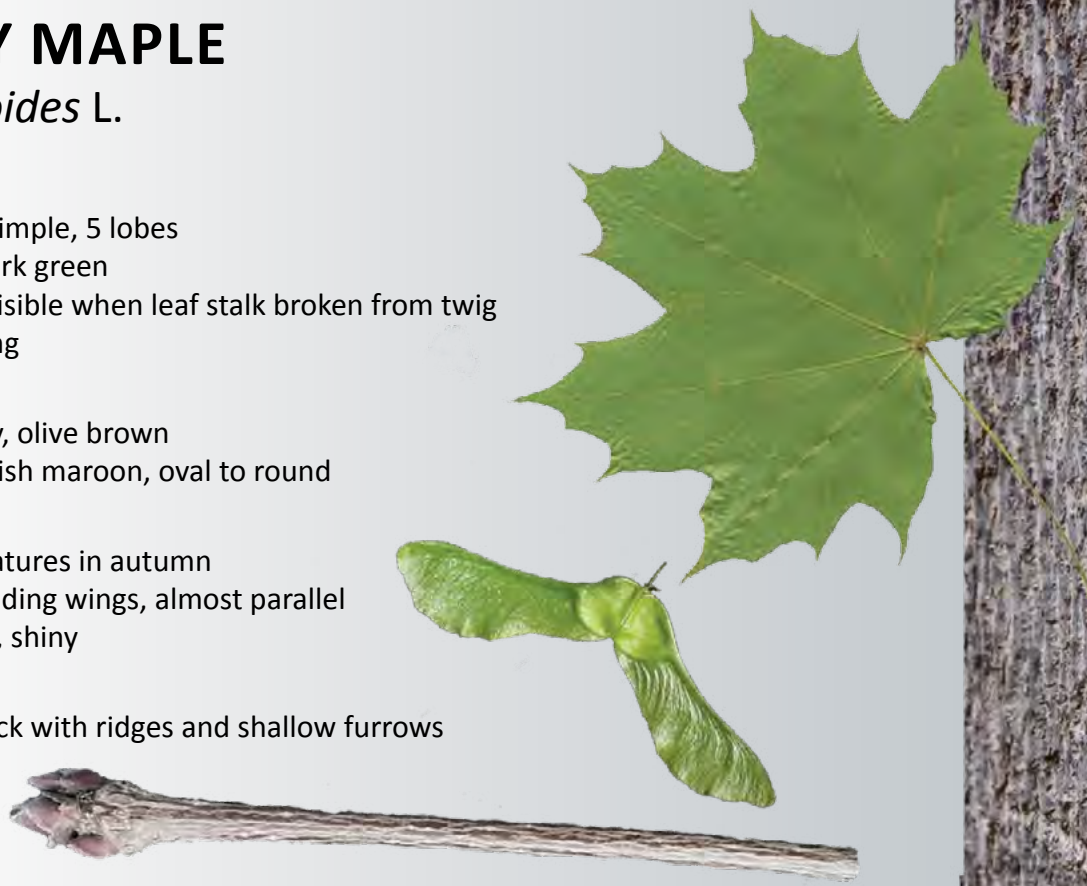
- Stout, shiny, olive brown
- Buds greenish maroon, oval to round

Fruit

- Samara, matures in autumn
- Wide-spreading wings, almost parallel
- 1.5-2” long, shiny

Bark

- Grayish black with ridges and shallow furrows



YELLOW BUCKEYE

Aesculus flava Ait.

Leaves

- Opposite, 5 leaflets that originate from a common point
- Leaflets are finely toothed
- Medium to dark green
- 4-6” long

Twigs

- Thick, ashy gray to orangish brown, smooth
- No foul odor when bruised

Fruit

- Capsule with golden-brown coating
- Smooth bumpy exterior (no spines)
- One to three nutlike seeds (“buckeyes”)

Bark

- Young bark is smooth and gray brown
- Mature bark breaks into flaky, rectangular plates

OHIO BUCKEYE

Aesculus glabra Willd.

Leaves

- Opposite, 5 leaflets that originate from a common point
- Leaflets are finely toothed
- Medium to dark green
- 4-6” long

Twigs

- Thick, ashy gray to red brown, smooth
- Disagreeable odor when bruised

Fruit

- Capsule with greenish-brown coating
- Round with a spiny cover
- Single brownish-black seed (“buckeye”)

Bark

- Ashy gray, thick, deeply fissured, and scaly

COMMON HORSECHESTNUT

Aesculus hippocastanum L.

Leaves

- Opposite, 5-7 leaflets that originate from a common point
- Leaflets double toothed, often long pointed
- Medium to dark green
- 4.0-9.8” long

Twigs

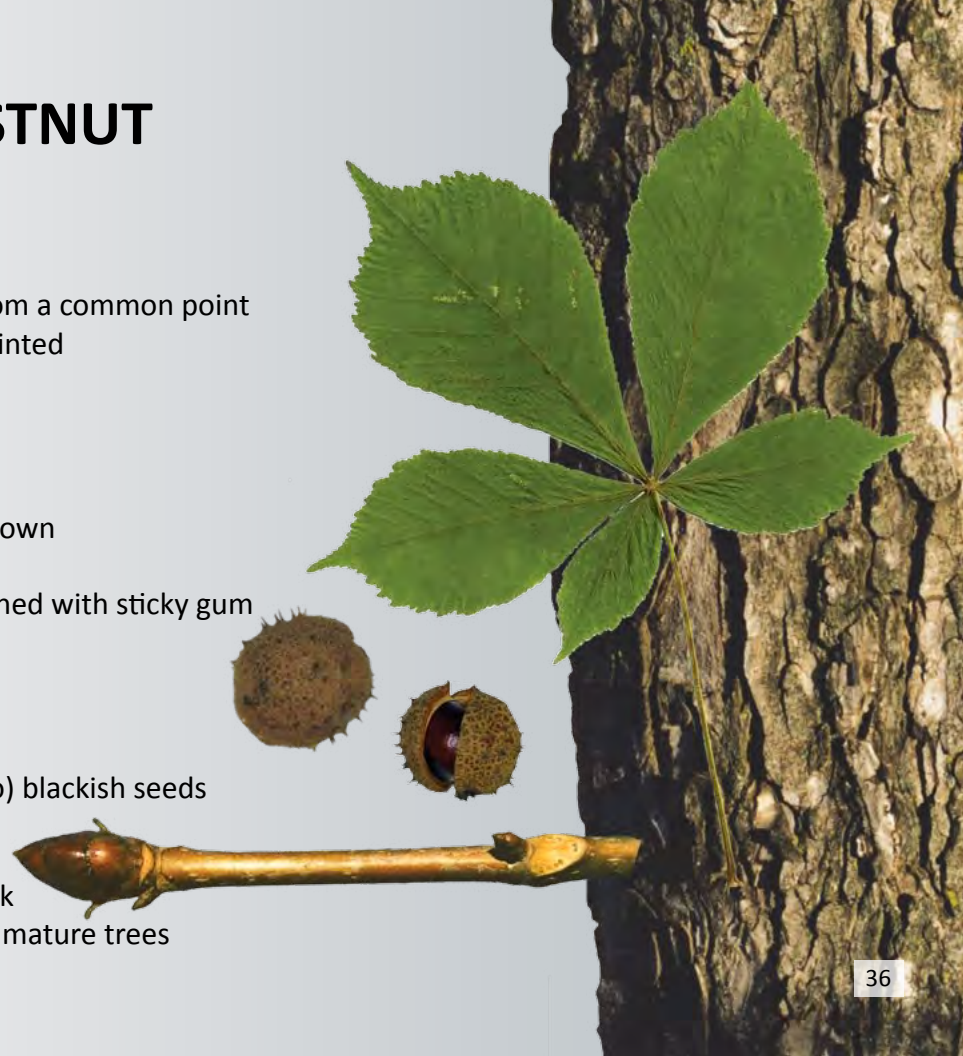
- Very thick, reddish yellow to grayish brown
- Smooth or slightly downy
- Buds large, dark reddish brown, varnished with sticky gum

Fruit

- Capsule, matures in autumn
- Coating is greenish light brown, spiny
- Capsule contains one (occasionally two) blackish seeds

Bark

- Dark gray to brown, orangish inner bark
- Bark peels in plates and wide strips on mature trees



RIVER BIRCH

Betula nigra L.

Leaves

- Alternate, simple, double toothed
- Diamond to oval shaped
- Wedge-shaped leaf base, 1.2-3.0” long

Twigs

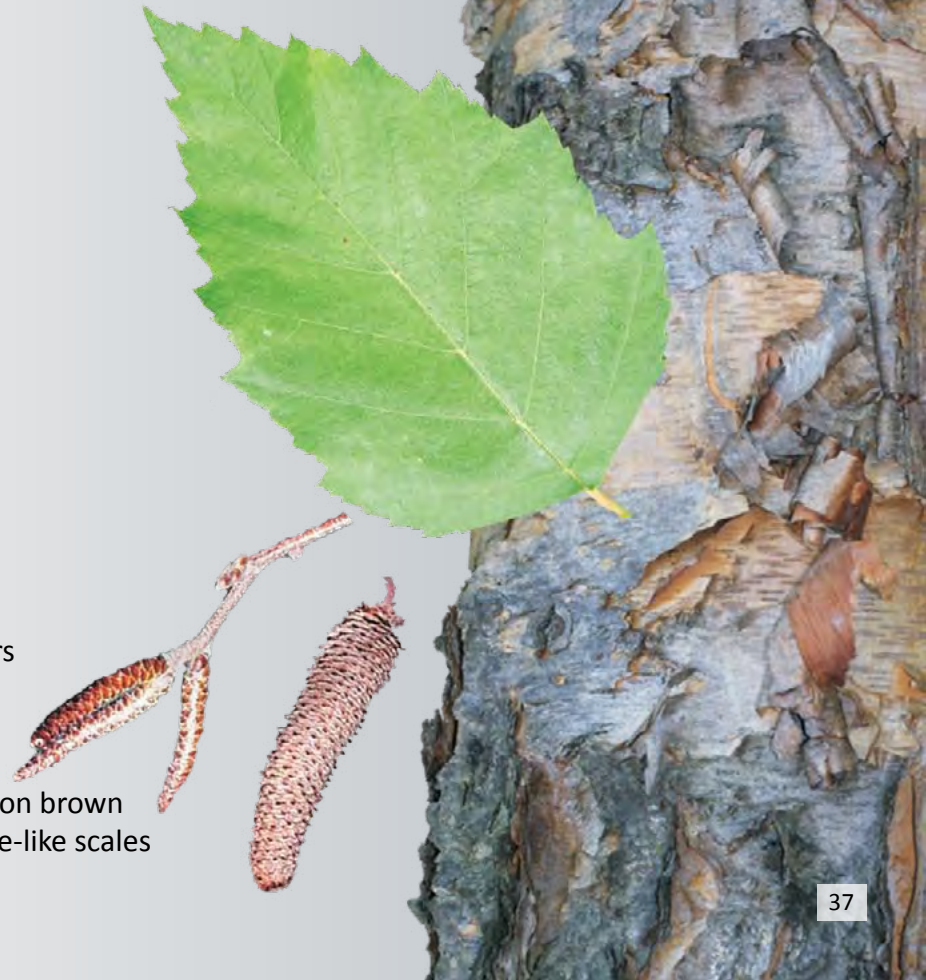
- Light reddish brown
- Slender, often with minute hairs
- Buds chestnut brown, slightly hairy

Fruit

- Small winged nutlet, maturing in spring
- Arranged in tight, erect, cylindrical clusters
- The only spring-fruiting birch

Bark

- Cream, salmon, orange brown, or cinnamon brown
- Peeling and deeply furrowed, broken plate-like scales



PAPER BIRCH

Betula papyrifera Marsh.

Leaves

- Alternate, simple, oval shaped
- Double toothed
- Dark green above, pale yellow green below
- 2-5.2” long

Twigs

- Smooth to lightly grainy texture
- Reddish brown
- Many small, raised white spots on surface

Fruit

- Small winged nutlet
- Arranged in tight, drooping, cylindrical clusters

Bark

- Chalky white and peeling into thin paper-like layers
- Thin to wide horizontal black lines

GRAY BIRCH

Betula populifolia Marsh.

Leaves

- Alternate, triangular shape, almost straight base
- Margins with double row of two different sized teeth
- Dark green, papery texture, rough on upper surface, smooth on lower surface

Twigs

- Branchlets spreading and slender
- Orange brown to gray
- Scattered pale, warty glands on surface

Fruit

- Cones are 0.75” long
- Contain many hairy 3-lobed seeds
- Cones are singular and drooping

Bark

- Thin and smooth
- Dull grayish to chalky white
- Noticeable triangular black patches at bases of branches

WHITE WILLOW

Salix alba L.

Leaves

- Alternate, simple, lance shaped
- Bright green above, silvery green beneath
- Finely toothed

Twigs

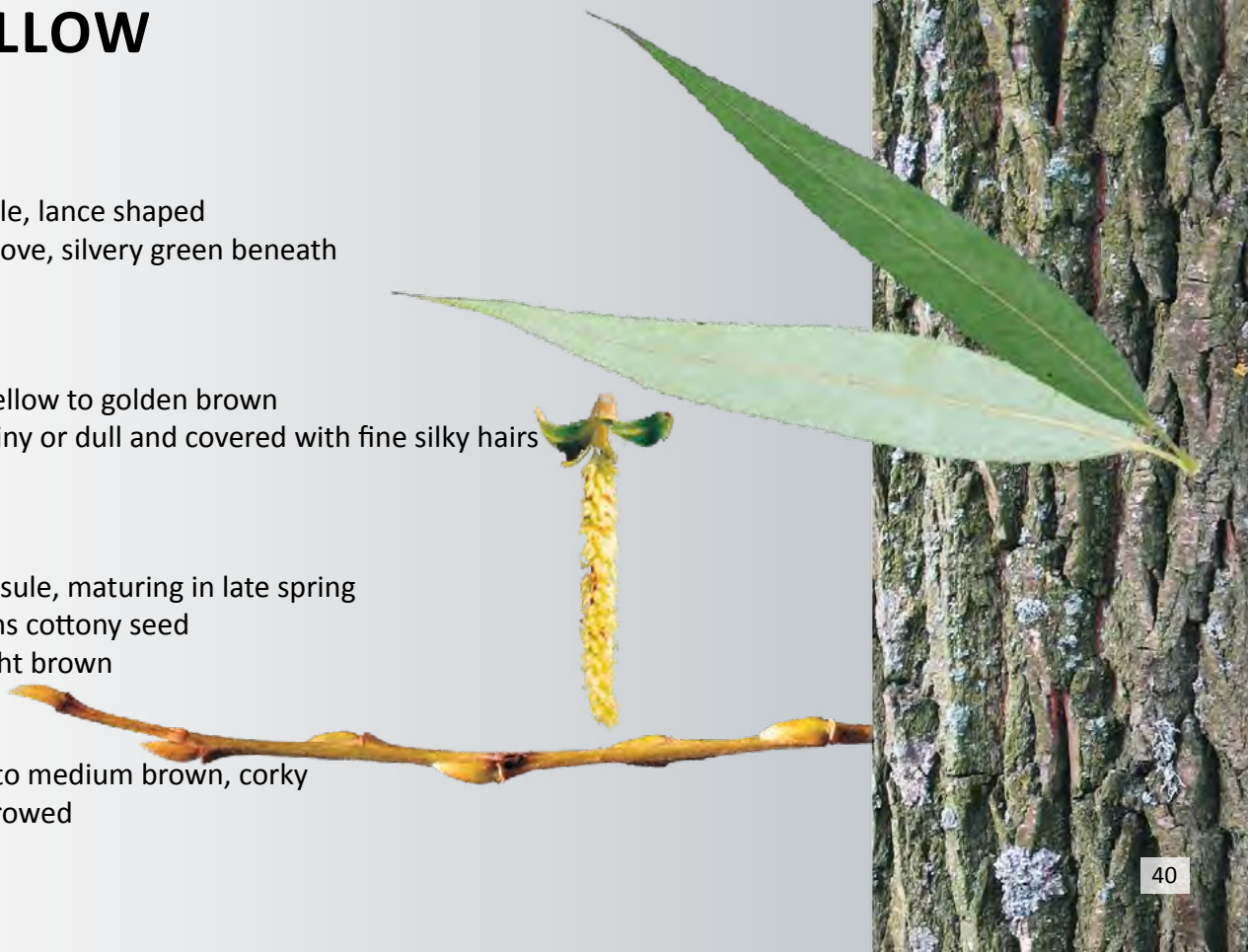
- Slender, light yellow to golden brown
- Smooth and shiny or dull and covered with fine silky hairs
- Bitter to taste

Fruit

- Two-valved capsule, maturing in late spring
- Capsule contains cottony seed
- Hairless and light brown

Bark

- Golden brown to medium brown, corky
- Ridged and furrowed



WEEPING WILLOW

Salix babylonica L.

Leaves

- Alternate, simple, lance shaped, finely toothed
- Dark green above and grayish below
- Smooth, 2.4-7.1” long

Twigs

- Reddish brown to brown, smooth
- Distinctive weeping habit

Fruit

- Capsules, maturing in May-June
- Oval, green

Bark

- Dark brown to black
- Heavily furrowed and ridged

BLACK WILLOW

Salix nigra Marsh.

Leaves

- Narrowly lance shaped, long pointed, finely toothed
- Shiny green above and whitish beneath
- 3-6” long

Twigs

- Purplish green to pale orange brown
- Slender and smooth
- Buds reddish brown or yellowish

Fruit

- Capsule, approximately 0.25” long, oval to cone shaped
- Capsules arranged in long clusters
- Matures in late spring

Bark

- Dark brown to nearly black
- Deep furrows, jagged scaly ridges

AMERICAN ELM

Ulmus americana L.

Leaves

- Alternate, simple, double toothed
- Dark green, rough, with short hairs
- Unequally rounded at leaf base, 2.7-6.0” long

Twigs

- Light red brown, slender
- Smooth or slightly hairy
- Buds light reddish brown

Fruit

- Disc-shaped samara, maturing in late spring
- Approximately 0.5” long
- Notched at end, fringed with hairs

Bark

- Brown to dark gray with alternating whitish buff color
- Often scaly, with deep intersecting ridges
- Young bark has a corky feeling

CHINESE ELM

Ulmus parvifolia Jacq.

Leaves

- Alternate, simple, oval shaped, double toothed
- Unequally rounded at leaf base
- Dark green; smooth above; soft, short hairs beneath
- 1-2.5” long

Twigs

- Gray brown
- Slender and slightly hairy
- Buds reddish brown, oval, and pointed

Fruit

- Disc-shaped samara, maturing in late summer
- Rounded and notched
- Lime green, maturing to gray brown

Bark

- Mottled; peeling in irregular orange, green, and gray patches

MIMOSA, SILKTREE

Albizia julibrissin Durazz.

Leaves

- Alternate, divided twice
- Dark green; sometimes with soft, short hairs
- 18-30 pairs of leaflets

Twigs

- Slender, greenish at first; gray brown at maturity
- Have many lenticels (pores), smooth, angled
- Buds are rounded and brownish

Fruit

- Pods, light straw to gray brown in color and thin
- Maturing in September-October
- Usually persists through winter

Bark

- Smooth, gray brown

HACKBERRY

Celtis occidentalis L.

Leaves

- Alternate, simple, single toothed
- Base unequally rounded
- Bright green above, paler beneath
- 2.4-3.5” long

Twigs

- Slender, light olive brown to reddish brown
- Often zigzag between buds
- Buds are small, chestnut brown, downy

Fruit

- Fleshy and berry like, ripening in autumn
- Dark red to blackish purple

Bark

- Grayish brown with corky warts or ridges

KATSURA TREE

Cercidiphyllum japonicum

Leaves

- Two forms, 1-4” long
- Juvenile form (pictured above): opposite, egg shaped with a heart-shaped base, finely toothed
- Mature form (pictured below): single leaf on spurred shoot, heart shaped, finely toothed

Twigs

- Thin, brown, opposite buds

Fruit

- Inconspicuous small green flowers in early spring
- Clusters of small green pea-like pods

Bark

- Brown, older bark shaggy
- Usually grows with multiple trunks

WHITE ASH

Fraxinus americana L.

Leaves

- Opposite, 5-9 leaflets arranged in two rows along an axis (leaf stalk)
- Shallow teeth near tips or on entire leaf
- Dark green above, paler green below
- 7.9-11.8” long

Twigs

- Stout, gray to greenish brown
- Buds rusty to blackish brown
- Smiling leaf scars

Fruit

- Samara shaped like a canoe paddle
- 1-2” long

Bark

- Ashy gray to light brown
- Interlacing ridges form narrow diamond-shaped furrows

EUROPEAN ASH

Fraxinus excelsior L.

Leaves

- Opposite, 7-9 leaflets arranged in two rows along an axis (leaf stalk)
- Dark green above, lighter green beneath
- 2-4” long

Twigs

- Grayish or grayish brown, stout
- Scattered minute white spots
- Buds are nearly black

Fruit

- Samaras shaped like canoe paddles
- Arranged in drooping clusters

Bark

- Ashy gray to gray brown
- Interlacing ridges and furrows, older trees may appear scaly

GREEN ASH

Fraxinus pennsylvanica Marsh.

Leaves

- Opposite, 7-9 leaflets arranged in two rows along an axis (leaf stalk)
- Single toothed, most apparent near tip
- Medium to dark green
- 9.9-11.8” long

Twigs

- Stout, gray to greenish brown
- May be smooth or very downy
- Buds are dark rusty brown

Fruit

- Samara shaped like a canoe paddle
- 1-2.5” long

Bark

- Ashy gray to gray brown
- Interlacing ridges form narrow diamond-shaped furrows

GOLDENRAIN TREE

Koelreuteria paniculata Laxm.

Leaves

- Alternate, 7-15 leaflets arranged in two rows along an axis (leaf stalk)
- Deeply serrated margin
- Dark green turning yellow in fall
- 5.8-20” long

Twigs

- Stout, reddish brown, zig-zag bud arrangement
- Yellow flowers, grow in large terminal clusters
- Buds are round, dark rusty brown

Fruit

- Clusters of papery, triangular capsules
- Contain three hard, black, globular seeds
- 1-2”long

Bark

- Silvery gray, flat ridge tops
- Reddish furrows

AMERICAN SYCAMORE

Platanus occidentalis L.

Leaves

- Alternate, simple, 3-5 lobes
- Coarsely toothed along margins
- Medium to dark green, very large, 4-8” wide

Twigs

- Light orange brown
- Stout, round, generally zig zag between buds
- Buds dark reddish brown and gummy

Fruit

- Bristly brown balls, maturing in autumn
- Composed of many narrow nutlets
- Usually one ball per stalk

Bark

- Peeling layers of brown, green, and white
- Bark peeling on upper trunk exposes cream-colored inner bark

LONDON PLANETREE

Platanus x *acerifolia* (Ait.) Willd.

Leaves

- Alternate, simple, 5-9” long, very wide
- 3-5 lobes, coarsely toothed
- Petiole base covers bud

Twigs

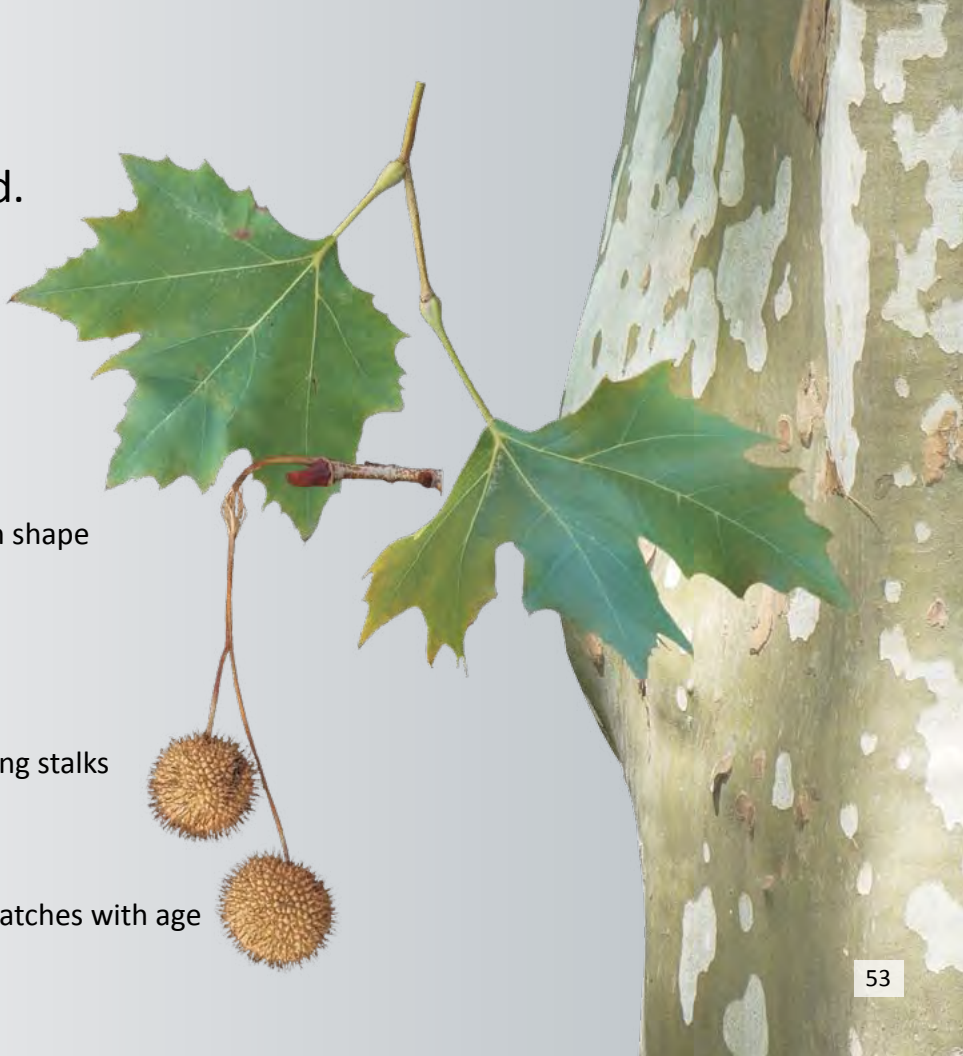
- Green to grayish brown
- Buds are reddish in color and conical in shape
- Twigs have zig-zag form

Fruit

- Spherical in shape, 1-1.5” diameter
- Ripens to brown
- Usually appears in pairs, hangs from long stalks

Bark

- Light brown
- Changes to creamy, olive, and yellow patches with age



WHITE POPLAR

Populus alba L.

Leaves

- Alternate, simple, 3-5 lobes
- Coarsely toothed lobes
- Dark green above, woolly white below
- 4.5-8.4” long

Twigs

- Greenish gray to reddish brown
- Often covered with cottony wool
- Buds reddish brown, pointed

Fruit

- Conical capsule containing cottony seeds
- Arranged in erect or drooping clusters

Bark

- Smooth whitish gray, becoming rough, blackish, and furrowed at the base

EASTERN COTTONWOOD

Populus deltoides Bartr. ex Marsh.

Leaves

- Alternate, simple, triangular
- Coarse-toothed leaves, flattened stem
- Medium green above and pale green below
- 3-7” long

Twigs

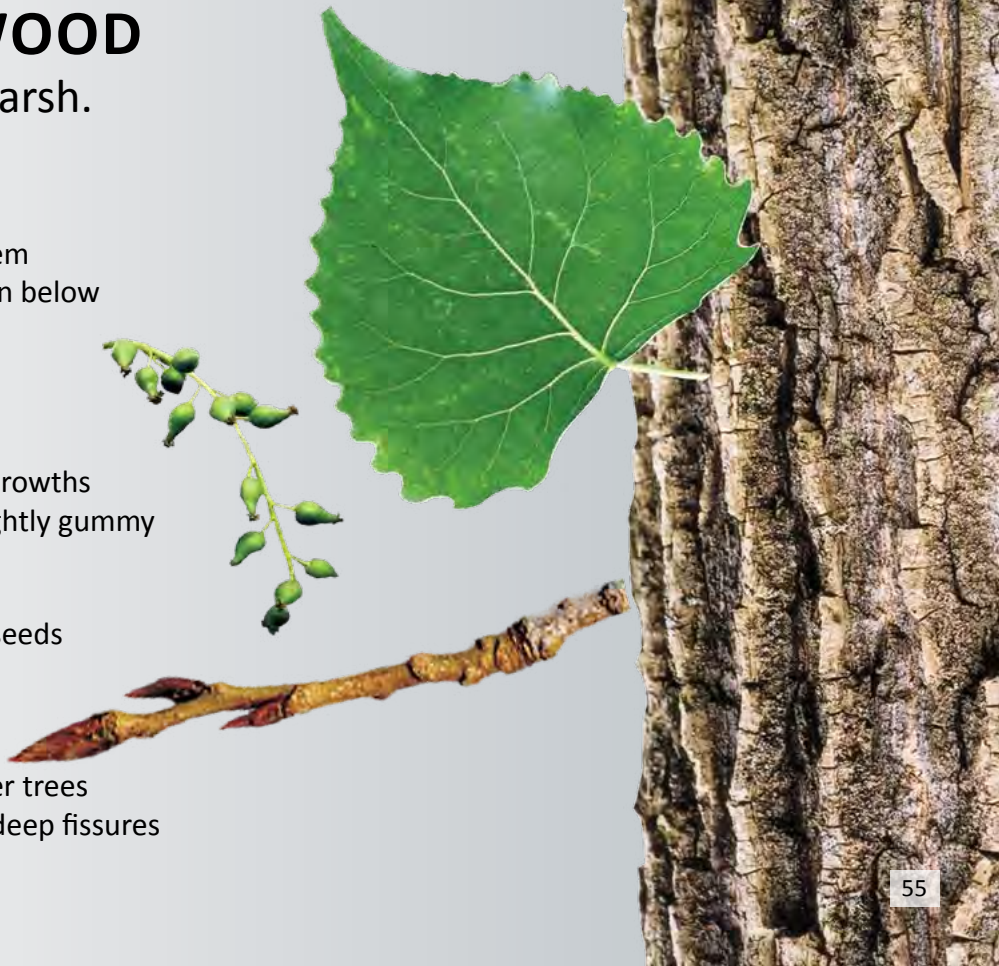
- Greenish yellow to brown
- Stout; often ringed by large, warty growths
- Buds greenish brown, shiny, and slightly gummy

Fruit

- Conical capsule containing cottony seeds
- Arranged in loose drooping clusters

Bark

- Ash gray, greenish yellow on younger trees
- Thick, flattened or rounded ridges, deep fissures



BIGTOOTH ASPEN

Populus grandidentata Michx.

Leaves

- Alternate, simple, coarse curved teeth
- Dull green above with minute white hairs below
- Leaf stalks long, slender, flattened, or compressed
- 2-3” long

Twigs

- Stout, brownish gray to reddish brown
- Buds are pointed, gray brown
- Velvety coating gives buds “dusty” appearance

Fruit

- Narrow conical capsules containing cottony seeds
- Light green and slightly curved
- Arranged in drooping clusters

Bark

- Greenish gray, smooth, thin
- Older bark is dark brown and furrowed with scaly ridges, orange tinge to younger bark

LOMBARDY POPLAR

Populus nigra var. *italica* Muenchh.

Leaves

- Alternate, simple, triangular
- Wavy, saw toothed
- Dark green above, light green below
- 2-4” long

Twigs

- Slender, brownish orange
- Buds are shiny, reddish brown
- Buds long pointed and lay close to twig

Fruit

- Trees are all male and bear no seeds
- Propagate by cutting and root sprouts

Bark

- Initially smooth and gray green, becoming blackish brown and irregularly furrowed

EUROPEAN MOUNTAIN ASH

Sorbus aucuparia L.

Leaves

- Alternate, 9-15 leaflets arranged in two rows along an axis (leaf stalk)
- Each leaflet lance shaped to uniformly wide
- Leaflets sharply toothed at margins

Twigs

- Branches heavy bodied and spreading
- Gray, smooth, and shiny

Fruit

- Fruits are in clusters
- Individual fruits rounded, about 0.3” in diameter

Bark

- Very thin; usually less than 0.15” thick
- Initially smooth surface turns rough with age
- Gray

A tree-lined Chicago street once infested with Asian longhorned beetle is replanted after eradication.

Reforestation After Asian Longhorned Beetle

U.S. Forest Service, Urban and Community Forestry

Tree planting is a critical component of helping a community recover from a pest infestation or natural disaster. Plant the right tree in the right place to ensure that trees grow well, provide desired benefits, and don't conflict with infrastructure. A brief checklist of basic steps for tree selection, planting, and maintenance is included below.

Tree planting following Asian longhorned beetle eradication activities in Worcester, MA.

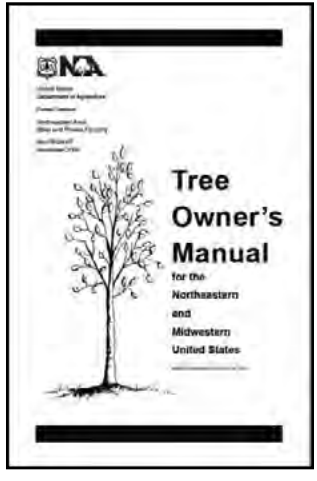
Plan – Work with knowledgeable professionals to develop a comprehensive reforestation plan. The plan can address prioritizing planting areas, planting/maintenance specifications, recommended species, working with partners and volunteers, inspecting work, and documenting progress. Develop detailed planting site plans for specific areas.

Assess Planting Site – Assess all aspects of the site that may affect the tree such as rooting space, distance to buildings, sidewalks, utilities, and competing trees. Check for underground utilities through the location service in your area. Consider the hardiness zone and soil type, drainage, and pH. Check local ordinances that regulate planting on public property.

Select Appropriate Species – Many nonhost species make good choices for urban areas. Select a variety of species to diversify the future tree population and make it more resilient to stresses. Match the characteristics of the tree, including mature size, to the site. Consider what function you want the tree to serve—shade, aesthetics, and privacy, among others.

Purchase Quality Tree Stock and Handle It Properly – Determine the type of stock that is best for your project and budget—bare root, potted, or balled and burlapped. Work with a quality nursery and make sure the trees meet accepted standards. Protect tree stock during transportation and on the site prior to planting. Warranties for tree survival and health are recommended.

Plant the Tree Correctly – Prepare the appropriate size hole for the root ball—not too deep! Remove burlap and wire basket. Check for encircling roots. If trees must be staked, do it correctly and plan to remove the stakes. Mulch and water at time of planting.



Suggested References and Web Sites

Tree Owner's Manual, U.S. Forest Service: www.treeownersmanual.info

Best Management Practices for Tree Planting, ANSI Standards for Nursery Stock and Transplanting, Principles and Practice of Planting Trees and Shrubs: available from The International Society of Arboriculture: http://www.isa-arbor.com/store/category.aspx

Northern Tree Selection Web Site: http://lyra.ifas.ufl.edu/NorthernTrees/

Your State Forester: http://www.stateforesters.org/about/who-we-are

Arbor Day Foundation: www.arborday.org

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