

TITLE: TREES OF NORTH AMERICA: The Angiosperms--Part III
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OPERATING INSTRUCTIONS: Begin this program with slide "1" on the screen and the tape advanced through the clear leader.

The following slides are in vertical format: none.

NOTE: Members of the following families are included in this slide-tape: Witchhazel--Hamamelidaceae; Linden--Tiliaceae; Pea--Leguminosae; Maple--Aceraceae; Buckeye--Hippocastanaceae; Tupelo--Nyssaceae; Olive--Oleaceae; and Trumpet Creeper--Bignoniaceae.

SLIDE 1: series title

In this slide-tape, we'll complete our look at the principal angiosperm genera of North America. All but the final two genera in this program are grouped together taxonomically because their flowers have petals that are separate and distinct from one another, rather than being fused together.

SLIDE 2: family title

The next family we'll consider is Witch hazel, Hamamelidaceae, a family of about 25 genera and 100 species, found chiefly in tropical and subtropical regions of the world. Three of these genera are found in North America, but only one contains trees.

SLIDE 3: genus title

This single tree-containing genus is sweetgum, Liquidambar.

SLIDE 4: map--worldwide distribution of genus

There are only six species of sweetgum in the world, and these are found growing in the warm temperate and tropical regions of the Northern Hemisphere. Only one species grows in North America.

SLIDE 5: fruit and seeds (*L. styraciflua*)

The fruits are undoubtedly the most unique characteristic of sweetgums. Each fruit is around, golf-ball-sized head of beaked capsules. The seeds themselves are small, brown, terminally winged, and come two per capsule.

SLIDE 6: leaves (*L. styraciflua*)

The leaves of sweetgums are also distinctive. They're simple, alternate, deciduous, and generally hand-sized. Most often they're star-shaped, with 5-7 deep lobes. When compared with other species, they look most like maple leaves.

SLIDE 7: leaves in fall (*L. styraciflua*)

In the fall, sweetgums turn lovely shades of yellow, purple, and fiery red, which makes them one of North America's most heavily planted ornamental trees. In many communities, especially in the Pacific Northwest, entire streets are lined with sweetgums.

SLIDE 8: normal twig/corky twig (both *L. styraciflua*)

Young twigs are normally smooth and yellowish-brown in color, but older twigs are usually covered with thick, corky bark.

SLIDE 9: tree (*L. styraciflua*)/list

As well as being important ornamentally, sweetgums are also important for fine furniture veneer and other wood products. Their tall, straight trunks, coupled with the fact that at maturity they may be 100 feet tall and 3-4 feet in diameter, make sweetgums highly prized hardwoods.

SLIDE 10: map--distribution of principal species in North America

Liquidambar styraciflua, sweetgum, is the only important sweetgum in North America. It grows on bottomlands throughout the central and southeastern United States.

SLIDE 11: family title

Next we'll look at the Linden family, Tiliaceae, which is comprised of 41 genera and approximately 400 species of trees, shrubs, and herbs. Although the trees are largely confined to the Northern Hemisphere, many of the shrubs and herbs are most common in the Southern Hemisphere. Only one tree-containing genus is found in North America.

SLIDE 12: genus title

This single genus is *Tilia*, called basswood by North American foresters and linden by most others.

SLIDE 13: map--worldwide distribution of genus

There are approximately 30 species of basswood distributed throughout the temperate regions of the Northern Hemisphere. Only four of these species are native to North America.

SLIDE 14: fruit (*T. americana*)

The fruits of basswoods are an unmistakable characteristic of the genus. They're small, round, fuzzy nuts borne in long-stemmed clusters, each joined directly to a long, thin, leaf-like bract.

SLIDE 15: leaves (*T. americana*)

The leaves of the basswoods are simple, alternate, and deciduous. They're ovate-to-round in shape and generally have serrate margins. The pronounced tip and rounded, asymmetrical bases give the leaves of many species a heart shape.

SLIDE 16: tree (*T. americana*)/list

Basswoods are prized for their lumber, which is light, soft, and pale colored. Although not a common species, it's used for furniture veneer, carving, paneling, match sticks and boxes, and piano keys. Throughout the Northern Hemisphere basswoods are also prized as shade trees.

SLIDE 17: map--distribution of principal species in North America

American basswood, *Tilia americana*, is the principal species native to North America. It grows best on deep, loamy soils throughout the northeastern part of the United States and southeastern tip of Canada.

SLIDE 18: family title

The next family we'll consider is the Pea family, Leguminosae, a very large family consisting of approximately 550 genera and 15,000 species of trees, shrubs, and herbs. Members of the family are scattered throughout the world, but most occur in dry tropical forests. About 20 tree-bearing genera and 40 species are native to North America, although only two are commercially important as forest trees.

SLIDE 19: genus title

The first of these genera is honeylocust, *Gleditsia*.

SLIDE 20: map--worldwide distribution of genus

The honeylocust genus contains about 12 species worldwide, primarily confined to the warm, temperate regions of the Northern Hemisphere. Only two species are native to North America.

SLIDE 21: thorns on twig/thorns on trunk (both *G. triacanthos*)

Without a doubt, thorns are the characteristic mark of the honeylocusts--there are no others like them in North America. Not only do the thorns grow from the twigs, as in the hawthorns, but they also arise in dense clusters from the main trunk. Most honeylocust thorns are 3-branched, although there are exceptions.

SLIDE 22: fruit (*G. triacanthos*)

Honeylocust fruits are also distinctive--they bear a remarkable resemblance to giant, flat string beans. As you can see in this slide, the pods are often highly twisted to aid in wind dispersal of the entire pod. Once the pod breaks open, numerous hard, brown seeds spill out.

SLIDE 23: leaves (*G. triacanthos*)

The leaves of honeylocust are often described as fern-like because of their feathery nature. They're alternate, deciduous, and pinnately compound--in fact, they're often bi-pinnately, or doubly, compound. It's interesting to note that the first leaves to emerge in spring are always singly compound, while those that develop later are often doubly compound, as shown in the slide. The individual leaflets are small--about finger-tip size--with slightly crenate margins. There are generally 15-30 leaflets per leaf.

SLIDE 24: leaves on tree (*Gleditsia* spp.)

The leaves are often clustered on short spur shoots, or directly on the twigs, which adds to the fern-like appearance of the tree.

SLIDE 25: bark (*Gleditsia* spp.)

The bark of honeylocusts is thin, dark, and has broad, jagged fissures--and, as stated before, often is heavily armed with thorns.

SLIDE 26: tree (*G. triacanthos*)/list

The wood of honeylocusts has little commercial value, although the green pods are often fed to cattle. The tree is highly prized as a shade tree because of its unique form and the pleasant shade it casts. Several ornamental varieties have been bred without thorns and pods specifically for landscaping purposes.

SLIDE 27: map--distribution of principal species in North America

The only important member of this genus native to North America is *Gleditsia triacanthos*, which is simply called honeylocust. Primarily, it's a bottomland species growing throughout the eastern and central United States, although it's quite tolerant of drought when planted elsewhere.

SLIDE 28: family title

The second genus in the Pea family we'll look at is locust, *Robinia*.

SLIDE 29: map--worldwide distribution of genus

There are about 20 species of locust native to North America and Mexico. Four of these reach tree size in the United States. As you might suspect from their names, locusts resemble the honeylocusts in many respects.

SLIDE 30: spines (*R. pseudoacacia*)

Like honeylocusts, the twigs of locusts are also armed, but rather than having true thorns, locusts have stipular spines. In addition locust spines are much smaller than the thorns of honeylocusts, and are unbranched.

SLIDE 31: fruit comparison (*R. pseudoacacia*, *G. triacanthos*)

The fruits of the locusts are also legumes, bearing many bean-like seeds, but unlike honeylocusts, locust pods are straight. They're also much smaller than the pods of honeylocust.

SLIDE 32: leaves (*R. pseudoacacia*)

Like the leaves of honeylocust, locust leaves are deciduous, alternate, and pinnately compound, although they're never doubly compound. The individual leaflets are small, elliptical, and have entire margins. Generally there are 7-19 leaflets per leaf, fewer than on honeylocust.

SLIDE 33: flowers (*R. pseudoacacia*) The flowers of the locusts are distinctly pea-like, much different from the small, inconspicuous flowers of honeylocust.

SLIDE 34: tree (*R. pseudoacacia*)/list

The wood of locusts is very resistant to insects and decay, but is difficult to machine. Therefore, locusts are often converted into fence posts and railroad ties, but little else. Since nodules on the roots of locusts are able to fix atmospheric nitrogen, locusts are commonly used to reclaim severely disturbed sites like strip mines. Locusts generally have low ornamental value except in droughty climates where little else will grow.

SLIDE 35: map--distribution of principal species in North America

Black locust, *Robinia pseudoacacia*, is the only locust important in North America and grows natively throughout the greater Appalachian Region. It has, however, been widely planted across the Great Plains and arid West, and has become naturalized over much of this area as well.

SLIDE 36: family title

The next family we'll consider is the maple family, *Aceraceae*. The Maple family includes only two genera, but approximately 115 species of trees and shrubs, widely distributed throughout the Northern Hemisphere. Most, however, are concentrated in China, and many are very rare. Only one tree-containing genus is native to North America...

SLIDE 37: genus title

...and this is maple, *Acer*.

SLIDE 38: map--worldwide distribution of genus

There are about 115 species of maple scattered across the Northern Hemisphere; most are concentrated in Asia and many are extremely rare. Approximately 13 species are native to North America--of these five or six are important commercially.

SLIDE 39: fruits (various *Acer* spp.)

Fruit is perhaps the best way to identify a maple. Most maples have the familiar double samara, like the sugar maple of the Northeast and bigleaf maple of the Pacific Northwest. Several species, like boxelder--shown in the center of the slide--have only single samaras, however. Regardless of whether they're single or double, samaras may be tightly clustered against the twig, or hang in long racemes. In some species the fruits ripen and disperse in the fall, while in others they do so in the spring. Regardless of when they're released, all maple seeds are extremely good flyers due to their helicopter-like wings.

SLIDE 40: leaves (various *Acer* spp.)

The leaves of the maples exhibit great variety. All are opposite, and most are deciduous and simple. Of the leaves that are simple, all are palmately lobed, some deeply and some shallowly, and most have 3-9 lobes. Size varies greatly from several inches to over a foot across.

SLIDE 41: leaves (*A. negundo*)

The leaves of a few species, like the boxelder pictured, are pinnately compound rather than simple, while the leaves of other species may even be unlobed.

SLIDE 42: variety of leaves (*Acer* spp.)

Although most maple leaves are green, some varieties are red or purple, while others are beautifully variegated. Again, there's great diversity within this genus.

SLIDE 43: bark (*A. macrophyllum*)

The bark of most maples is brown and furrowed--not very different from hundreds of other species. But in some maples the bark exfoliates much like the birches, while in others it exhibits very striking colors and patterns.

SLIDE 44: tree (*A. macrophyllum*)/list split

Maples are very important for the wood products they yield. Various maples are highly prized for furniture, veneer, flooring, tool handles, and turnery items. Sugar maple is, of course, also a source of maple syrup.

SLIDE 45: fall color (*Acer* spp.)

Maples are also extremely important aesthetically. Their brilliant fall colors in New England are world famous, while their shape, variety and color make them among the most highly prized trees in the world for ornamental purposes.

SLIDE 46: maps--distribution of principal species in North America

There are a number of important maples in North America: bigleaf maple, *Acer macrophyllum*, stretches along much of the west coast. Three other maples share similar ranges in the eastern half of the continent. Of these three, sugar maple, *Acer saccharum*, extends farthest north, silver maple, *Acer saccharinum*, extends farthest west, and red maple, *Acer rubrum* drops farthest south. Box elder, *Acer negundo*, has the widest range of any of these species, but is the least important commercially.

SLIDE 47: family title

The next family we'll look at is the Buckeye family, Hippocastanaceae, a small family of 3 genera and about 30 species of trees and shrubs widely scattered throughout the warm regions of the Northern Hemisphere.

SLIDE 48: genus title

Only one genus in this family reaches tree-size in North America and that is buckeye, *Aesculus*, which is often also called horse-chestnut.

SLIDE 49: map--worldwide distribution of genus

The buckeye genus contains 16 species of trees and shrubs widely distributed throughout the Northern Hemisphere. Six species are native to North America, but none are particularly important commercially.

SLIDE 50: fruit (*Aesculus x carnea*)

Buckeye fruits are the principal identifying characteristic of this genus. Each fruit is a round, firm capsule containing anywhere from one to five large seeds. The outer covering of the capsule is always leathery and splits open cleanly along distinct sutures. In some species the capsule is covered with coarse, leathery spines, while in others it's smooth.

SLIDE 51: fruit (*Aesculus x carnea*)

Each seed is a reddish-brown ball, about the size of a golf ball, and is dominated by a large, white dot. These seeds are inedible to humans, and may, in fact, be poisonous, although in some countries they're ground and fed to cattle.

SLIDE 52: flowers (*Aesculus* spp.)

The flowers of buckeyes are truly spectacular. Individual flowers are large and bell-shaped, and are borne in large, showy, upright panicles. They range in color from white to pink to deep red.

SLIDE 53: leaves (*Aesculus* spp.)

The large, opposite, palmately compound leaves of the buckeyes are also good identifying characteristics. Elliptical leaflets that are normally 5-7" long radiate out from a long, floppy petiole.

SLIDE 54: tree (*Aesculus* spp.)/word split

The wood of buckeyes has little commercial value, but the trees are highly prized for landscaping purposes because of their beautiful flowers and unique fruits.

SLIDE 55: map--distribution of principal species in North America

Yellow buckeye, *Aesculus octandra*, and Ohio buckeye, *Aesculus glabra*, are the two common buckeyes native to North America. Both grow through the Appalachian Mountains and Ohio River Valley, but neither could be considered an important tree. The tree most commonly planted in the United States is actually a hybrid imported from southern Europe.

SLIDE 56: family title

The final family that we'll consider in this group is Tupelo, Nyssaceae, a small family of 3 genera and 10 species scattered across eastern North America and Asia.

SLIDE 57: genus title

Only one of these genera is native to North America, and it's simply called tupelo, *Nyssa*.

SLIDE 58: map--worldwide distribution of genus

Nyssa is a small genus containing 6 or 7 species scattered throughout the warm temperate regions of North America and the Far East. Two of these species are native to the southeastern United States.

SLIDE 59: fruit (*Nyssa* spp.)

Perhaps the best identifying clue to a tupelo is its fruit, which is a small, oblong, purple drupe. Inside is a single, one-seeded pit, often with deep ridges or wings.

SLIDE 60: leaves (*Nyssa* spp.)

The leaves of tupelos are simple, alternate, and deciduous, and are often crowded out near the tips of the branches.

SLIDE 61: tree (*N. aquatica*)/map

Two species of tupelo are native to eastern North America: black tupelo, *Nyssa sylvatica*, which grows on dry to wet sites throughout the eastern United States, and water tupelo, *Nyssa aquatica*, which grows primarily on floodplains, bottomlands, and swamps of the southern United States.

SLIDE 62: family title

The final two families that we'll look at are grouped together because the petals of their flowers are fused together, in a trumpet shape. The first of these is the Olive family, Oleaceae, which contains between 20 and 40 genera and over 400 species of trees and shrubs distributed throughout the warm temperate and tropical regions of the Northern Hemisphere. Four genera that contain trees are found in North America, but only one is important commercially.

SLIDE 63: genus title

That single genus is ash, *Fraxinus*.

SLIDE 64: map--worldwide distribution of genus

There are about 65 species of ash in the world, most distributed throughout the warm, temperate regions of the Northern Hemisphere. About 16 species are native to North America, with five attaining commercial size.

SLIDE 65: fruit (*F. latifolia*)

The fruits of ash are 1-seeded samaras, each with a single, long terminal wing. They hang from the tree in dense clusters. As with the other samaras we've seen, ash seeds are good flyers.

SLIDE 66: leaves (*F. latifolia*)

The leaves of ash are always opposite, and are generally deciduous and pinnately compound with 5-13 leaflets. The leaflets are generally elliptical to lanceolate and may have either entire or serrate margins.

SLIDE 67: tree (*F. latifolia*)/list split

The wood of ash is hard, but elastic, and it scarcely warps--making it prized for stressful items like baseball bats and tool handles. In the past it was used for wagon and carriage building, and even for spear and arrow shafts. It's also important ornamentally as a shade tree.

SLIDE 68: map--distribution of principal species in North America

There are two important species of ash in eastern North America: white ash, *Fraxinus americana*, which grows across the eastern half of the United States, and green ash *Fraxinus pennsylvanica*, which grows over the same area as white ash, but extends all the way to the Rockies. The only important ash native to the West is Oregon ash, *Fraxinus latifolia*, which grows along the Pacific Coast.

SLIDE 69: family title

The final family we'll consider in this slide-tape series is the Trumpet Creeper family, Bignoniaceae, which contains approximately 100 genera and 750 species of trees, shrubs, vines, and herbs. Most of these species grow in the tropical regions of the world. Although three genera have members that reach tree-size in North America, only one is sufficiently important to be described here.

SLIDE 70: genus title

This single genus is catalpa, whose scientific name is also *Catalpa*.

SLIDE 71: map--worldwide distribution of genus

Catalpa is a small but distinctive genus containing 7 to 10 species found growing in the warm, temperate regions of the Northern Hemisphere, especially in China. Only two species are native to North America.

SLIDE 72: pods on tree/pods open with seeds (*C. speciosa*)

Catalpas are often called "bean trees", and for good reason. Their fruit is a long, many-seeded capsule that resembles an over-grown string bean. Notice, however, that the seeds of *catalpa* are winged, and therefore, wind dispersed, as opposed to beans, which are dispersed primarily by gravity.

SLIDE 73: flowers (*C. speciosa*)

A *catalpa* in full bloom is truly a sight to behold! Their flowers are large and showy, and are borne in huge, upright clusters. Notice how the individual petals are fused together in a trumpet shape. Also notice the different colored nectar guides that act as landing lights for pollinating insects. Since bees can see yellow, but not red, young flowers have yellow guides that later turn red, thus encouraging bees to visit the youngest flowers first.

SLIDE 74: leaves (*C. speciosa*)

The leaves of *catalpa* are very large and striking. They're simple, deciduous, opposite, and, as you can see, heart-shaped. You're not likely to confuse them with those of any other tree species.

SLIDE 75: tree (*C. speciosa*)

Catalpas are of minor importance overall. Their coarse-grained wood is very durable, even without preservatives, and is therefore often used for fence posts, railroad ties, and the like. Because of their beautiful flowers and unique fruits, *catalpas* are prized ornamental trees, particularly within their native ranges.

SLIDE 76: map--distribution of principal species in North America

Northern *catalpa*, *Catalpa speciosa*, and southern *catalpa*, *Catalpa bignonioides*, are the two *catalpas* native to North America. Their ranges are limited to the bottomlands and floodplains of a few midwestern and southern states. Neither is important commercially.

SLIDE 77: list of other genera

Needless to say, there are quite a number of other tree-containing genera that we haven't described in these slide-tapes. Some of the more distinctive ones are:

mulberry: *Morus*--a minor forest species occurring in the eastern half of the United States, but commonly planted for its fruit.

osage-orange: *Maclura*--which is native to the central and southern Midwest and is noted for its distinctive fruits which are often called "hedge apples" .

California-laurel: *Umbellularia*--which occurs along the Pacific coast of southern Oregon and California, and is often converted into beautiful clocks and novelties.

sassafras: *Sassafras*--a minor, understory species throughout the eastern United States.

holly: *Ilex*--a common but minor understory species throughout much of the eastern United States. We all recognize its sharp-pointed leaves around Christmas time.

buckthorn: *Rhamnus*--which contains five tree-sized species, the most important of which grows along the Pacific coast.

dogwood: Cornus--a common understory tree in the southeastern United States and along the Pacific Coast.

madrone: Arbutus--the principal species of which grows on dry, rocky sites along the Pacific Coast, and

persimmon: Diospyros--a small tree, common in abandoned fields throughout the eastern United States.

SLIDE 78: textbooks

Descriptions of these, and many other forest and horticultural trees, may be found in the numerous textbooks now available at both the national and regional level. The slide-tapes you've just seen are only a beginning toward really knowing these species--but hopefully, they'll provide a good foundation on which you can build.

SLIDE 79: Author Credit (no narration)

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SLIDE 80: FMC Credit (no narration)