A large, leafless tree with a thick trunk and a wide, spreading canopy of bare branches stands in the center of a field. The ground is a mix of green grass and brown, dry vegetation. In the background, there are more trees and a blue sky with scattered white clouds.

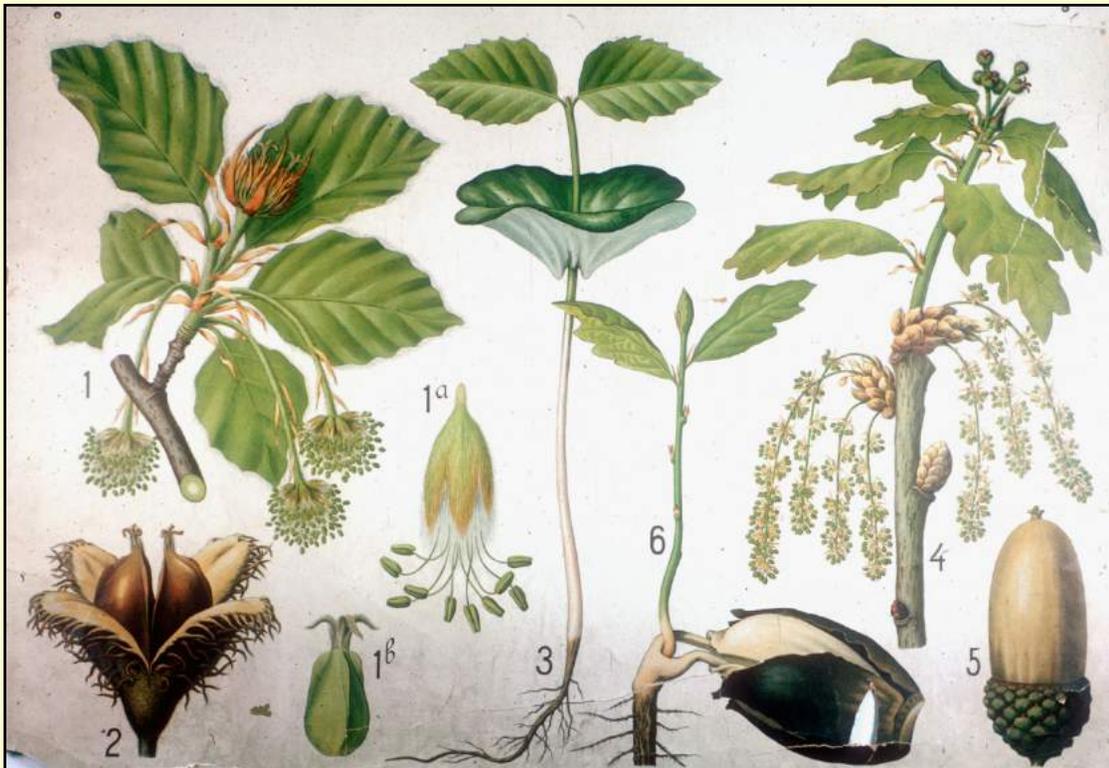
Diversity of Wisconsin Rosids

... oaks, birches, evening primroses ...

a major group of the woody plants (trees/shrubs)
present at your sites

The Wind Pollinated Trees

- Alternate leaved tree families
- Wind pollinated with **ament/catkin** inflorescences
- **Nut** fruits = 1 seeded, unilocular, indehiscent (example - acorn)



*Juglandaceae - walnut family

Well known family containing walnuts, hickories, and pecans

Only 7 genera and ca. 50 species worldwide, with only 2 genera and 4 species in Wisconsin



Juglans cinera
Butternut, white walnut



Carya ovata
shagbark hickory

*Juglandaceae - walnut family

Leaves pinnately compound, alternate
(walnuts have smallest leaflets at tip)

Leaves often aromatic from resinous peltate
glands; allelopathic to other plants



Juglans cinera
Butternut, white walnut



Carya ovata
shagbark hickory

*Juglandaceae - walnut family

The chambered pith in center of young stems in *Juglans* (walnuts) separates it from unchambered pith in *Carya* (hickories)



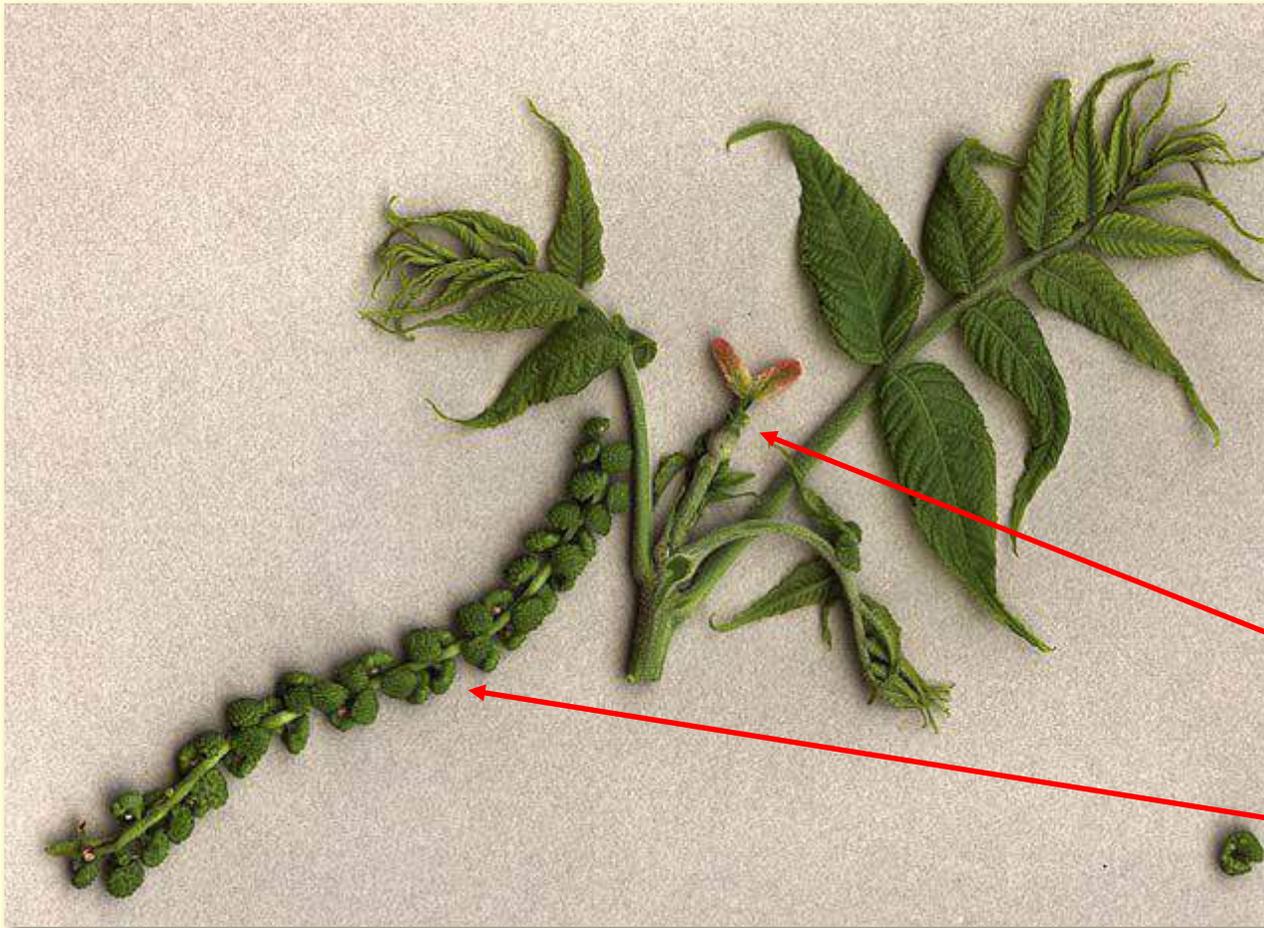
Juglans regia
English walnut



Solid pith in hickories
(*Carya illinoensis*)

Chambered pith in walnuts
(*Juglans regia*)

*Juglandaceae - walnut family



Trees are
monoecious

Wind pollinated

Female flower

Male inflorescence

Juglans nigra
Black walnut

*Juglandaceae - walnut family



Male flowers apetalous and arranged in pendulous (drooping) catkins or aments on last year's woody growth

Calyx small; each flower with a bract

CA 3-6 CO 0 A 3-∞ G 0

Juglans cinera
Butternut, white walnut

*Juglandaceae - walnut family



Juglans cinera
Butternut, white walnut

Female flowers apetalous and terminal

Calyx cup-shaped and persistent; 2 stigma feathery; bracted

CA (4) CO 0 A 0 G (2-3)



Juglans nigra
Black walnut

*Juglandaceae - walnut family

Fruit a **nut**

Single ovule fused to ovary wall

Surrounded often by persistent 4-parted calyx which can become fleshy;
thus sometimes mistakenly called a “drupe”



Carya cordiformis
Bitternut hickory



Juglans cinera
Butternut, white walnut

*Juglandaceae - walnut family

Fruit a **nut**

Single ovule fused to ovary wall

Surrounded often by persistent 4-parted calyx which can become fleshy;
thus sometimes mistakenly called a “drupe”



*Juglandaceae - walnut family



One of the most prized of all lumber trees for fine furniture is black walnut - primarily southern Wisconsin tree

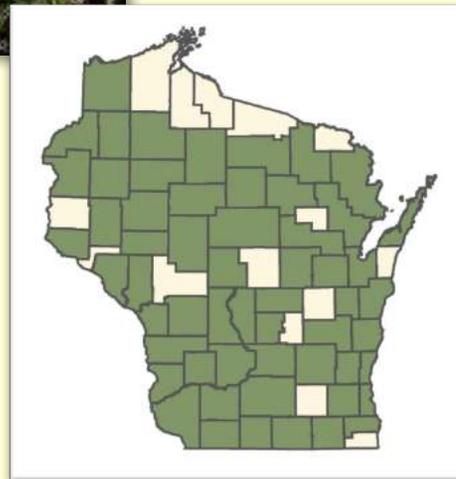


Juglans nigra - black walnut

*Juglandaceae - walnut family



Previously wide-spread, the butternut is now “special concern” species with up to 60% of the trees in Wisconsin now infected with the butternut canker fungus (*Sirococcus clavignenti-juglandacearum*)



Juglans cinera - white walnut, butternut

*Juglandaceae - walnut family

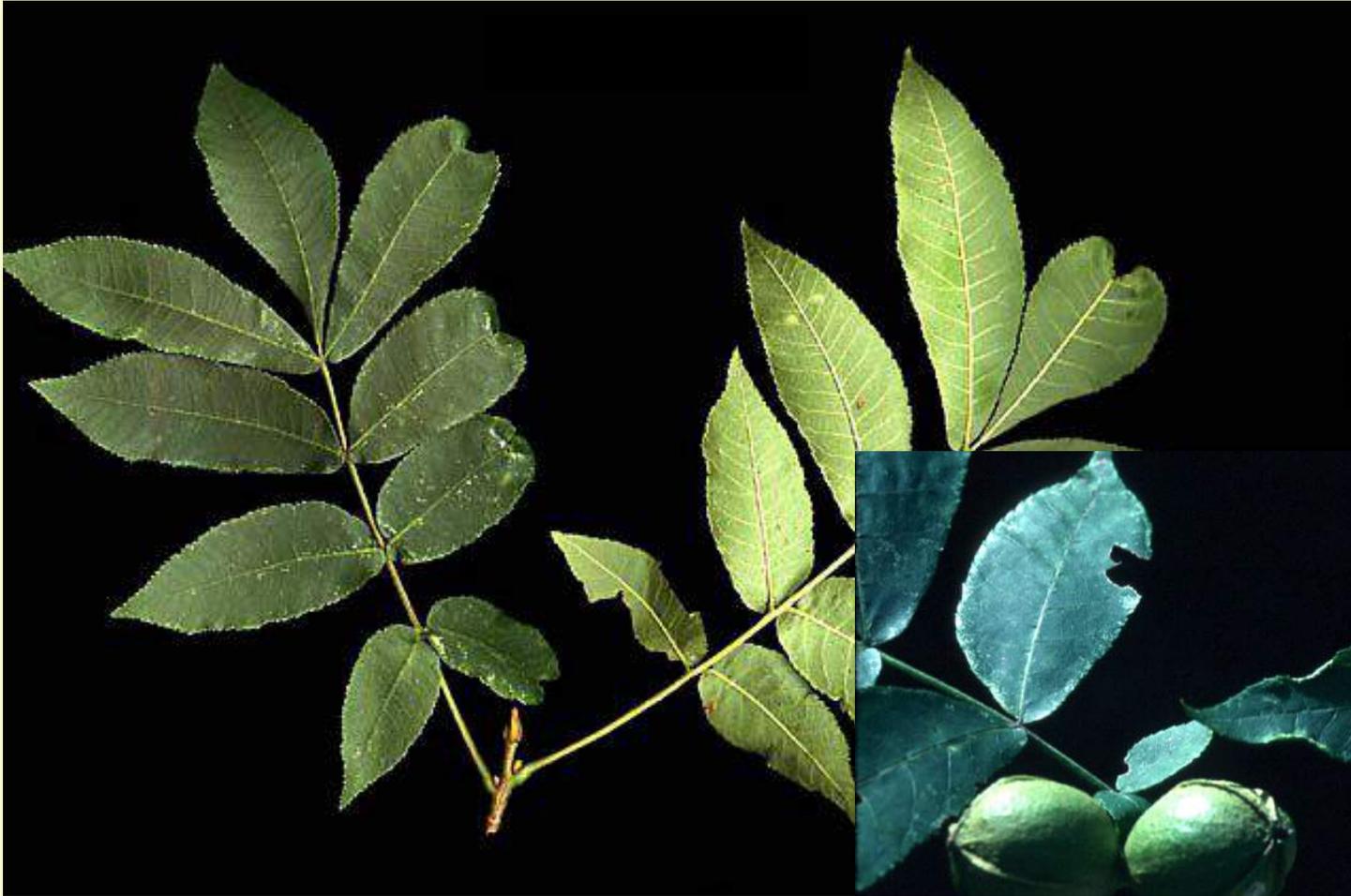
One of the more common trees of more mesic to xeric forests over much of Wisconsin - oak/hickory forests - is the shagbark hickory with its characteristic peeling bark and usually 5 leaflets

Carya ovata - shagbark hickory



401 final exam trick “flower”

*Juglandaceae - walnut family



Carya cordiformis
Bitternut hickory

Usually 7 leaflets



**Fagaceae - beech family

Similar to Juglandaceae, except simple leaves and nut enclosed by subtending bracts; comprise 8 genera and about 1000 species

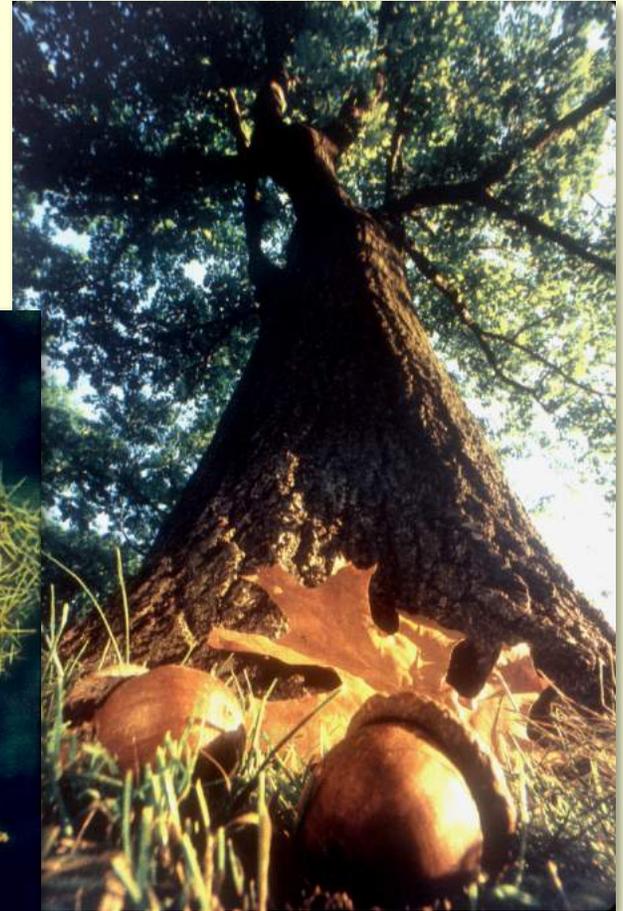
In Wisconsin we have beech, oaks, and chestnut



Fagus - beech



Castanea - chestnut



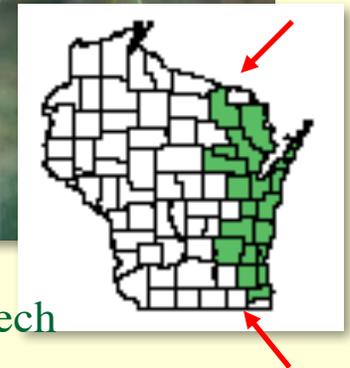
Quercus - oak

**Fagaceae - beech family



American beech is characteristic of mesic forests in eastern Wisconsin - beech/maple forest

Beech apparently colonized Wisconsin from both the southeast and northeast via Upper Peninsula



Fagus grandifolia - American beech

**Fagaceae - beech family

Branches are flattened, leaves with toothed edges

2 pistillate flowers (2 nuts) surrounded by one set of bracts

Fagus grandifolia - American beech



**Fagaceae - beech family



Quercus, the oaks, have bracts below female flower that coalesce into a woody cup of the **acorn** fruit (nut)

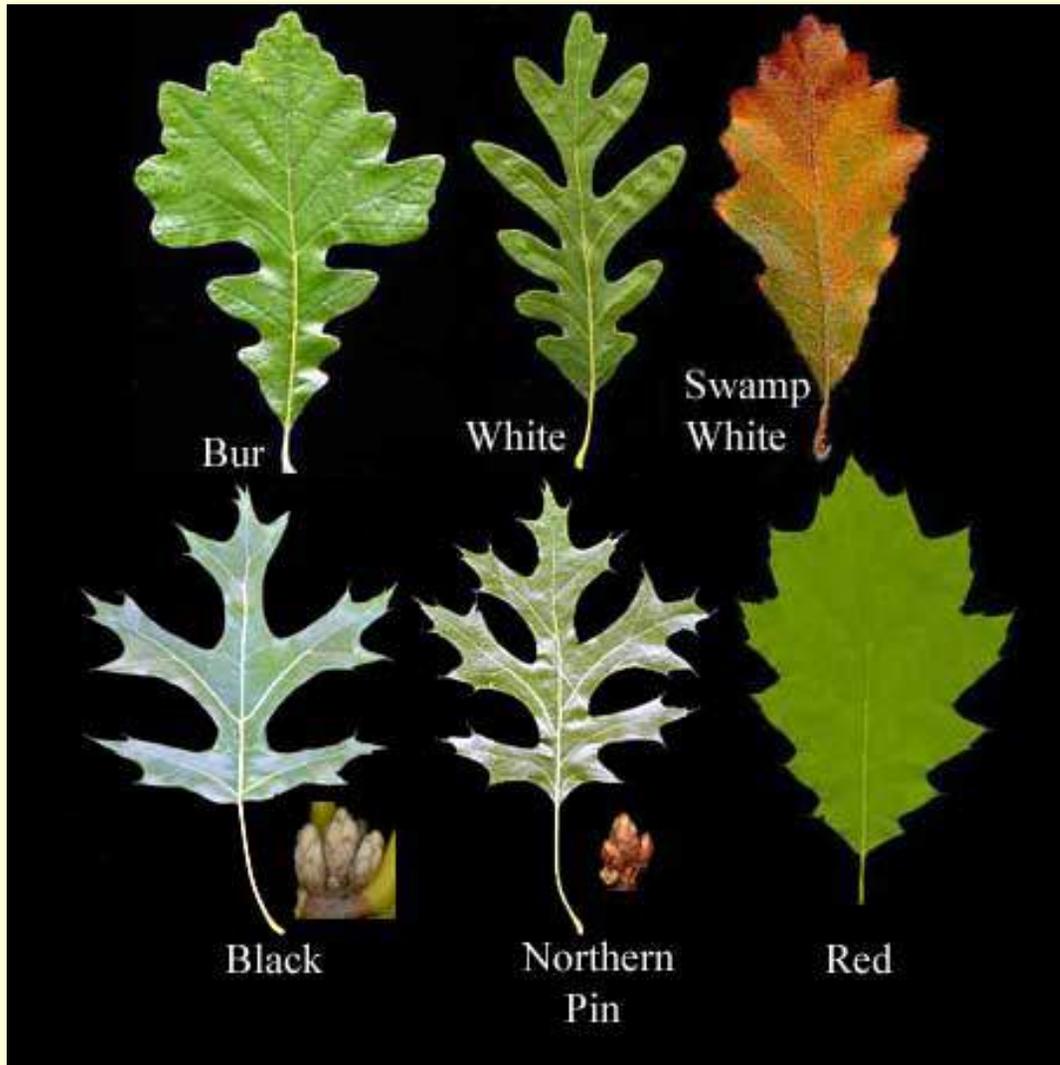
Quercus usually separated into two groups:

White oaks - rounded leaf lobes, thinner walled xylem of summer wood, fruit matures in 1 yr

Red oaks - bristle tipped leaf lobes, thicker xylem, fruit matures in 2 yrs



**Fagaceae - beech family



White oaks - rounded leaf lobes, thinner walled xylem of summer wood, fruit matures in 1 yr

Red oaks - bristle tipped leaf lobes, thicker xylem, fruit matures in 2 yrs

Extensive (!) hybridization within each of the two groups — species boundaries not at all clear

**Fagaceae - beech family

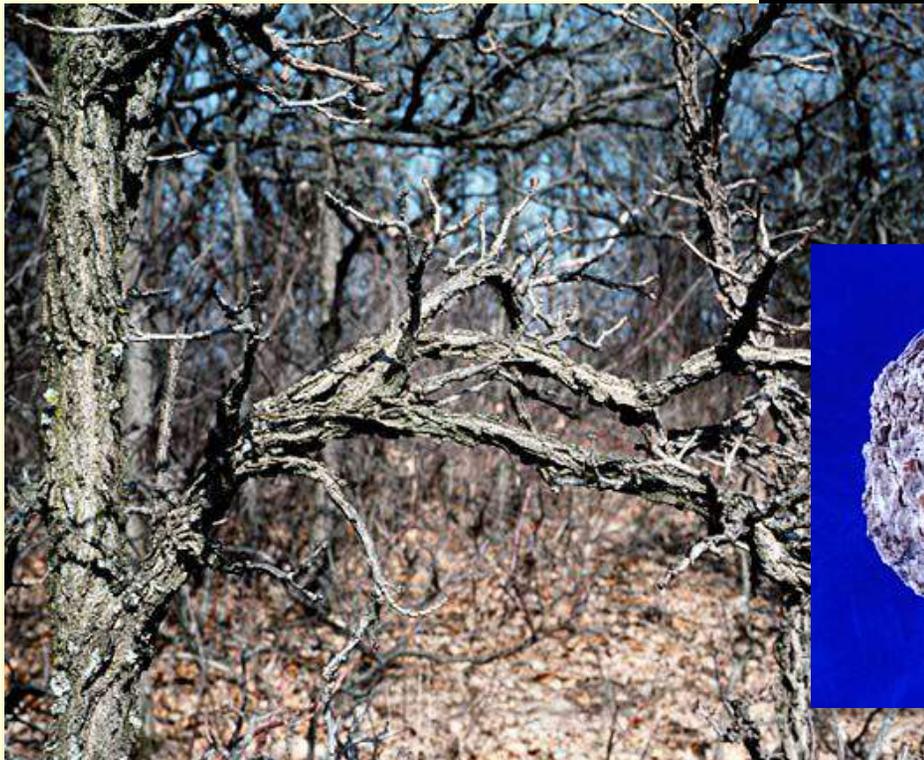
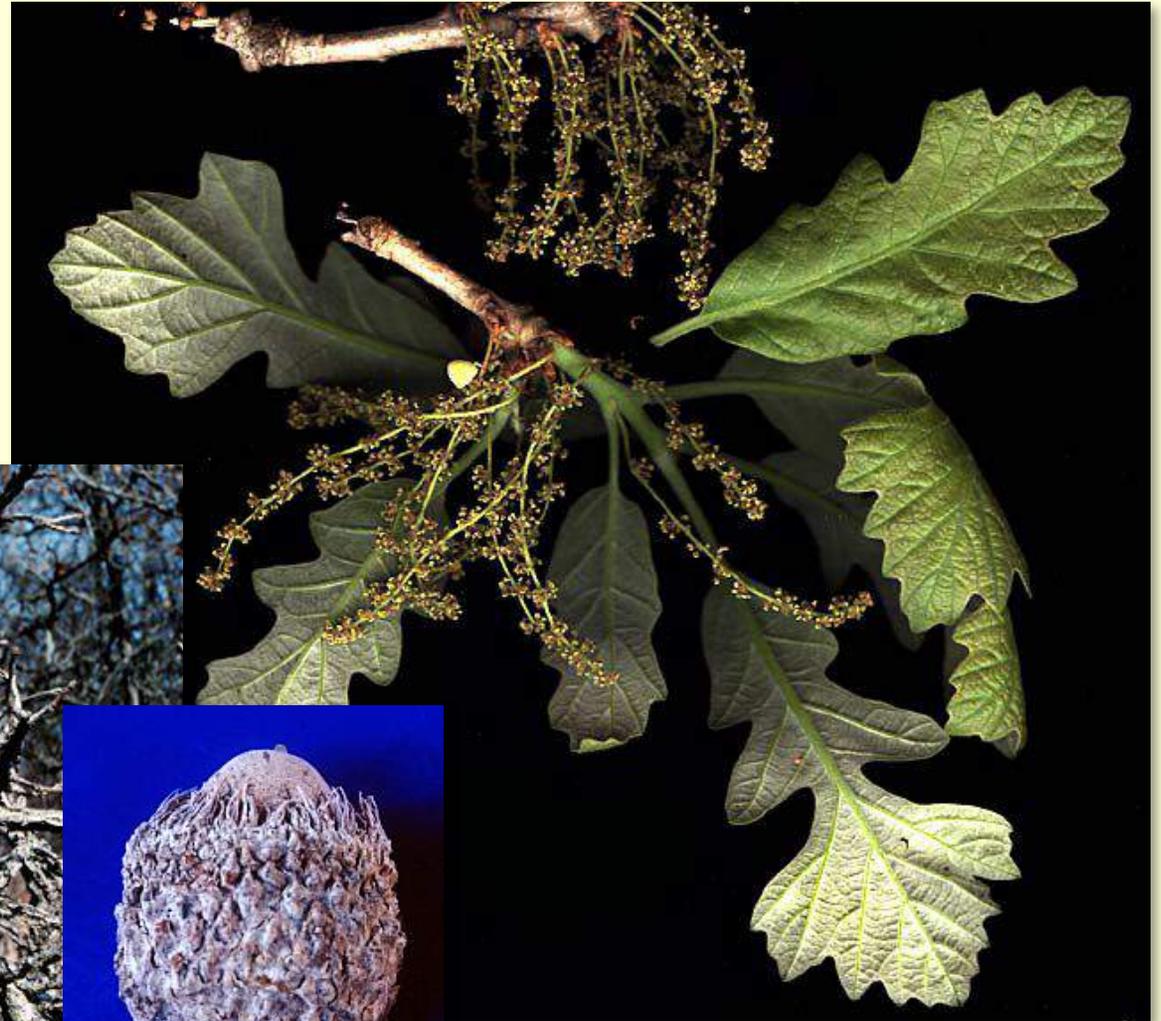
White oak - Alleghenian species typical of more mesic woodlands in Wisconsin.



Quercus alba - white oak

**Fagaceae - beech family

Bur oak: Ozarkian element
species of xeric oak woodlands
and oak savannas



Quercus macrocarpa
bur oak

**Fagaceae - beech family



Other white oaks:



Quercus muhlenbergii
Chinquapin oak



Quercus bicolor - swamp white oak

**Fagaceae - beech family

Red oaks:



Quercus rubra
Red oak

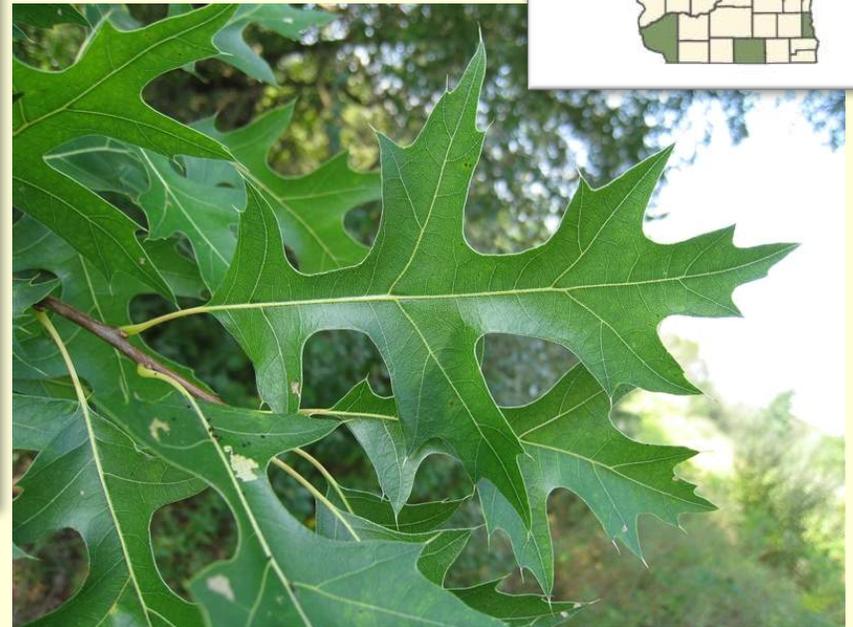


**Fagaceae - beech family

Red oaks:



Quercus velutina
Black oak



Quercus palustris
Pin oak
special concern

**Fagaceae - beech family



Castanea dentata American chestnut
Introduced and spreading

2-3 female flowers per spiny involucre



**Fagaceae - beech family



Castanea dentata
American chestnut



American chestnut
Massachusetts in
late 1800s

Japanese chestnut in
Connecticut -
resistant



**Betulaceae - birch family



Strictly monoecious family of shrubs and small trees

Both **female** (erect) and **male** (drooping) inflorescences are in aments/catkins

Fruit a small nut or 1 seeded samara, subtended by 3-lobed bract

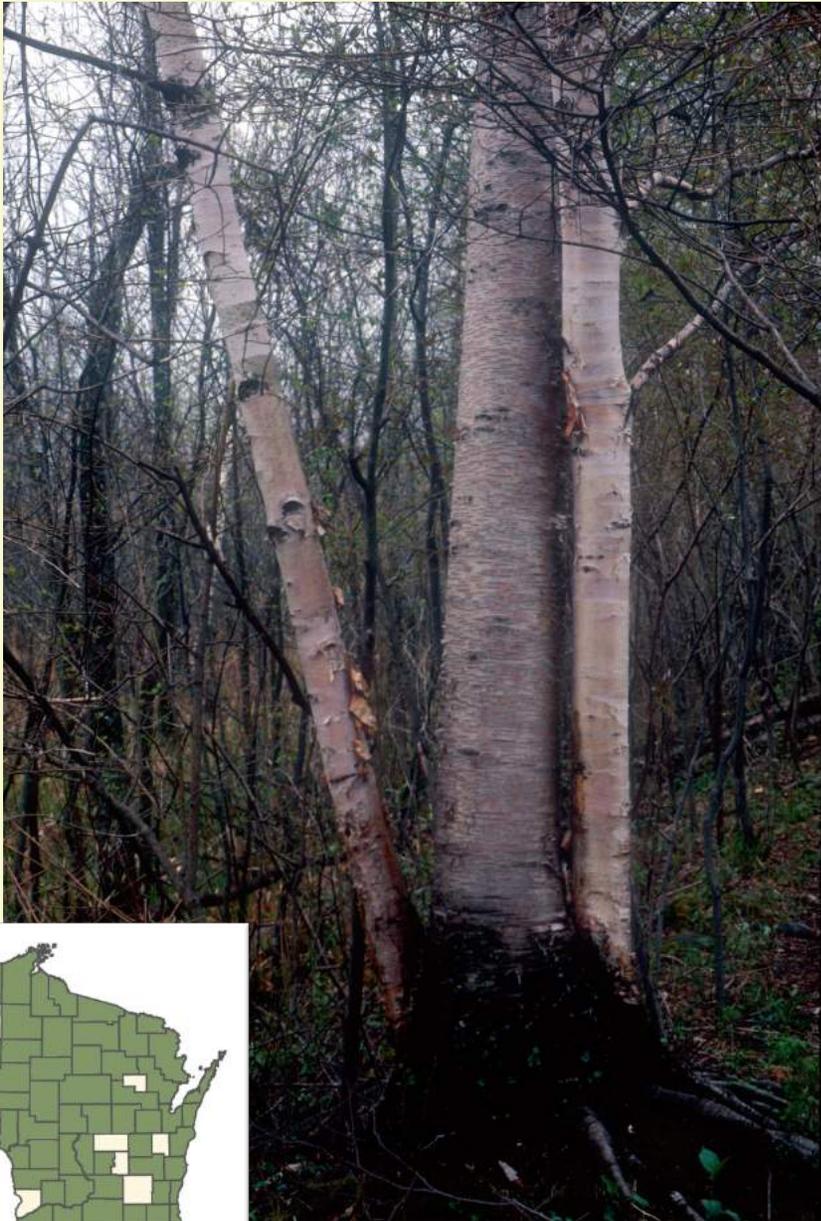


**Betulaceae - birch family



Betula papyrifera - paper birch

**Betulaceae - birch family



Betula pumila
Bog birch

Betula allegheniensis

Yellow birch

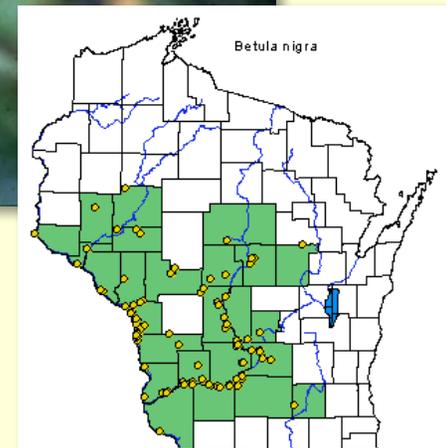
Characteristic of northern hardwood forest;
requires rich humus of tree falls to
germinate; once prized veneer tree

**Betulaceae - birch family



Betula nigra - river birch

River birch is a classic floodplain tree species south of the tension zone growing with silver maple



**Betulaceae - birch family



Alnus, the alders form extensive thickets in wet areas or along rivers and lakes; seeds form in woody “cone” inflorescences

**Betulaceae - birch family



Ostrya virginiana - eastern hop hornbeam, ironwood
Note the hops-like inflorescence

2 trees of mesic woods:

Humulus – hops
Cannabaceae



**Betulaceae - birch family



2 trees of mesic woods: and
Carpinus caroliniana
Hornbeam, blue beech,
muscle tree
Note the sinewy trunk

**Betulaceae - birch family



Corylus americana
Hazelnut, filbert



Corylus cornuta
Beaked hazelnut, filbert

Hazelnuts or filberts are small shrubs with highly prized fruits low in saturated fats

Myricaceae - bayberry family



Myrica gale - sweet gale

Dioecious shrubs or subshrubs with sweet aromatic smell

Fix atmospheric nitrogen via actinomycetes (*Frankia*) in roots (found in bogs, sandy soil)



Comptonia peregrina - sweet fern

*Lythraceae - loosestrife family



Lythrum alatum - winged loosestrife

Close relative of the evening primrose family; mainly tropical in distribution

4 genera and 5 species occur in Wisconsin, most of these are wetland plants

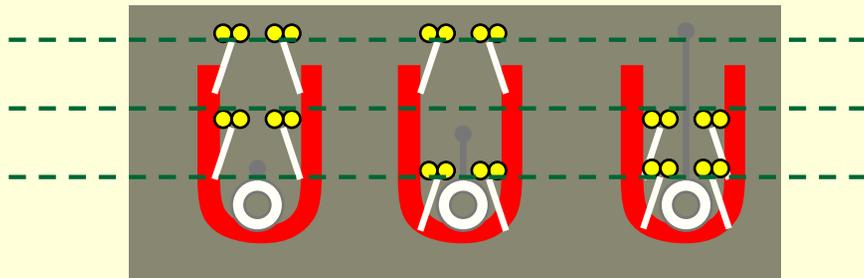
CA 4-6 CO 4-6 A 8-12 G (4)

Flowers 4, 5, or 6 merous with stamens double the number of sepals and in two distinct sets

Hypanthium well developed but with superior pistil = **perigynous**

*Lythraceae - loosestrife family

- **tristyly** common — 3 levels at which 2 sets of anthers and 1 set of styles are positioned



*Lythraceae - loosestrife family



Lythrum salicaria
purple loosestrife

Ecologically invasive in
wetlands; from Europe



*Lythraceae - loosestrife family



2 unrelated “loosestrifes”
Lythrum & *Lysimachia*



Lythrum alatum - winged loosestrife
Native species hybridizing with *L. salicaria*?

*Lythraceae - loosestrife family



Decodon verticillatus -
swamp loosestrife

This species has
whorled leaves =
“verticillate”



*Onagraceae - evening primrose family



A moderate sized family of 17 genera and about 650 species - most diverse in western N. America

6 genera and about 30 species in Wisconsin

Oenothera biennis - evening primrose

CA 4 CO 4 A 4,8 \overline{G} (4)

4 merous flowers, epigynous, and often well developed **hypanthium**

Evening primrose is hawkmoth pollinated



*Onagraceae - evening primrose family



Chamerion angustifolium - fireweed *Epilobium stricta* - willowherb

Chamerion & Epilobium have capsules opening to release seeds with comas

*Onagraceae - evening primrose family



Circaea canadensis - enchanter's nightshade



Circaea alpina
Northern enchanter's nightshade

2 merous flowers; fruit is one-seeded and bristly

*Onagraceae - evening primrose family



Oenothera (Gaura) biennis - gaura



Ludwigia palustris - water primrose

*Geraniaceae - geranium family



Common lavender flowered plant with lobed basal leaves **seen in many forest sites at final exam time**

Family often scented; 2 genera in Wisconsin



Geranium maculatum- wild geranium

*Geraniaceae - geranium family



Geranium maculatum- wild geranium

CA 5 CO 5 A 10 G (5)

5 merous flowers with a superior pistil
made up of 5 carpels each with a single
ovule

*Geraniaceae - geranium family



CA 5 CO 5 A 10 G (5)

Fruit is a **schizocarp** = dehiscent fruit where each carpel breaks apart separately; here each carpel in breaking off a one-seeded **mericarp**

Geranium maculatum- wild geranium



*Geraniaceae - geranium family



Geranium sibiricum
Siberian crane's - bill

Geranium robertianum
Herb robert

*Geraniaceae - geranium family



Erodium cicutarium - stork' s-bill
(naturalized)

The stork' s-bills of genus *Erodium*
drill their mericarps into the ground;
pinnately compound leaves



*Oxalidaceae - wood-sorrel family



Oxalis corniculata - creeping yellow wood sorrel

Family is both tropical and temperate with over 600 of the 900 species belonging to the genus *Oxalis*

Typically 3-foliolate leaves (the real Irish shamrock?), plants often creeping

Leaves are acidic to taste due to oxalic acid in the form of calcium oxalate

*Oxalidaceae - wood-sorrel family



Oxalis stricta - tall wood-sorrel

Flowers similar to wild geranium family,
but each of the 5 carpels have ∞ seeds
and produce capsules



*Oxalidaceae - wood-sorrel family



The violet wood-sorrel is an early spring flowering plant of prairies and dry woodlands south of the tension zone



Like the loosestrife and geranium families who all have 2 sets of stamens, trimorphic heterostyly (tristyly) is common

Oxalis violacea
Violet wood sorrel

*Staphyleaceae - bladdernut family



Single species in Wisconsin; easily recognized small tree by its striped bark, opposite odd-pinnately compound leaves, and 3 carpellate inflated or “bladder” fruit

Staphylea trifolia - bladdernut

