






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



Juglans cinera
Butternut, white walnut


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



Carya ovata
shagbark hickory


*Juglandaceae - walnut family



Juglans cinera
Butternut, white walnut

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

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



Carya ovata
shagbark hickory

***Juglandaceae - walnut family**

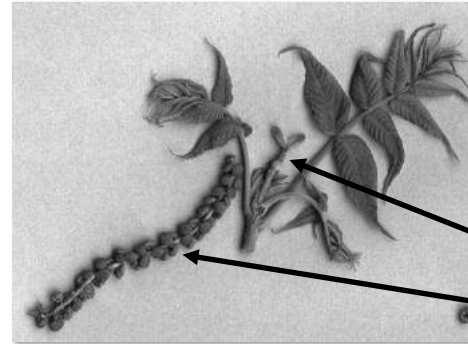


Juglans regia
English walnut

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



***Juglandaceae - walnut family**



Juglans nigra
Black walnut

Trees are **monoecious**
Wind pollinated

Female flower

Male inflorescence

***Juglandaceae - walnut family**



Juglans cinera
Butternut, white walnut

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

***Juglandaceae - walnut family**

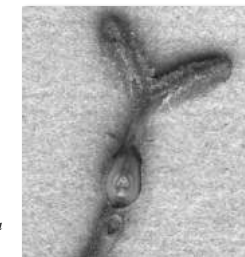


Juglans cinera
Butternut, white walnut

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

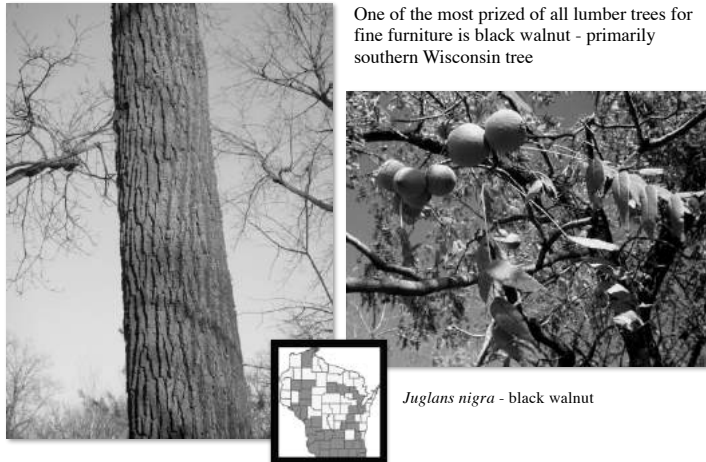
***Juglandaceae - walnut family**

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***Juglandaceae - walnut family**

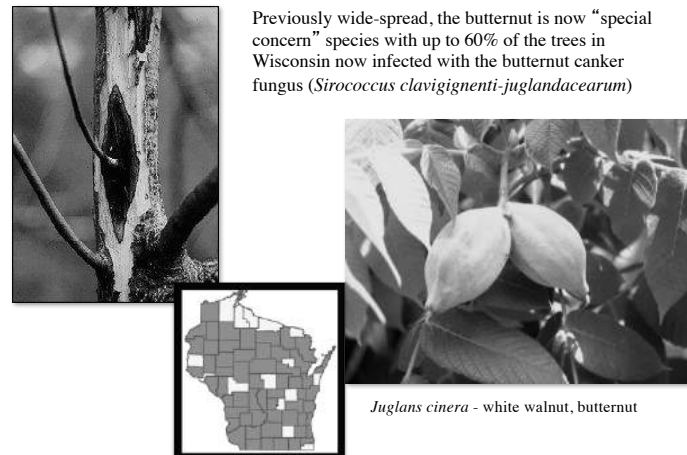
One of the most prized of all lumber trees for fine furniture is black walnut - primarily southern Wisconsin tree



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

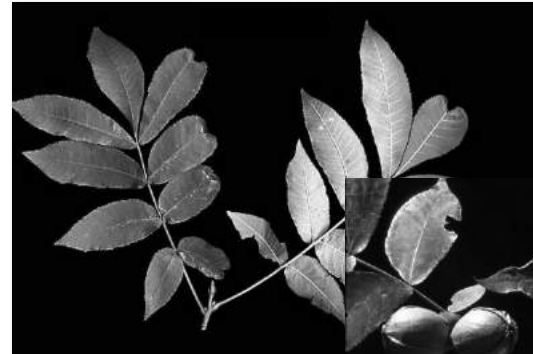
Carya ovata - shagbark hickory



401 final exam trick "flower"



***Juglandaceae - walnut family**



Carya cordiformis
Bitternut hickory

Usually 7 leaflets



****Fagaceae - beech family**



Fagus - beech

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



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

Fagus grandifolia - American beech

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



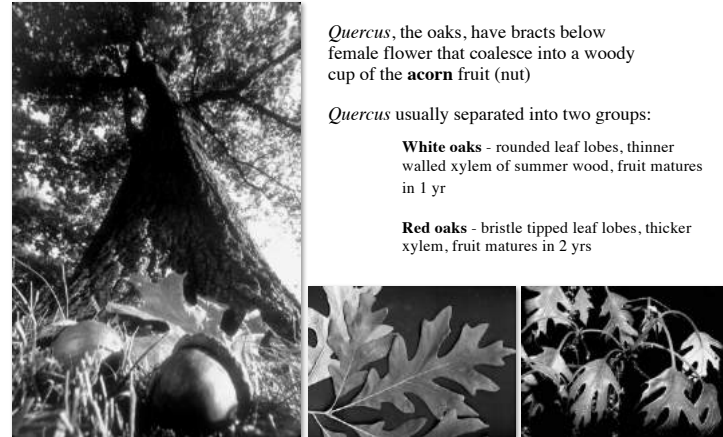
****Fagaceae - beech family**

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

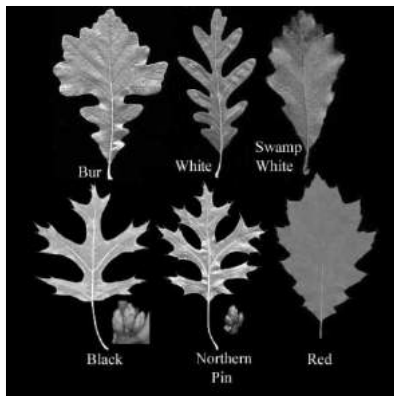
Quercus usually separated into two groups:

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**



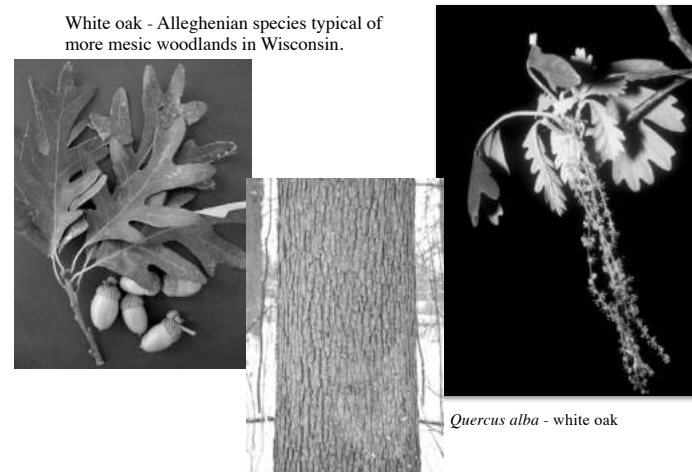
White oaks - rounded leaf lobes, thinner walled xylem of summer wood, fruit matures in 1 yr

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**

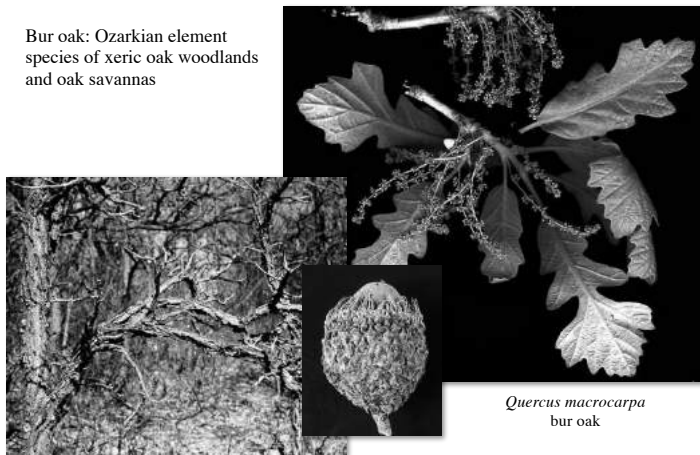
White oak - Alleghenian species typical of more mesic woodlands in Wisconsin.



Quercus alba - white oak

**Fagaceae - beech family

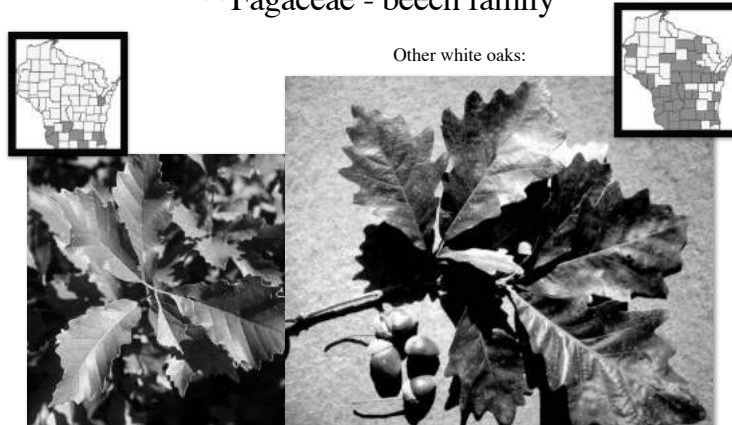
Bur oak: Ozarkian element
species of xeric oak woodlands
and oak savannas



Quercus macrocarpa
bur oak

**Fagaceae - beech family

Other white oaks:

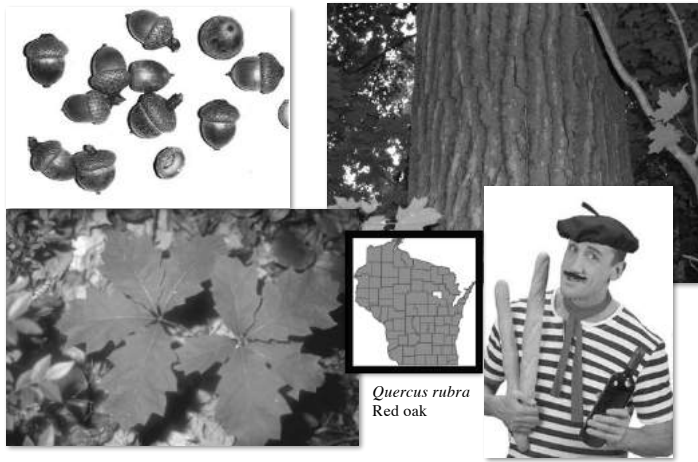


Quercus muhlenbergii
Chinquapin oak

Quercus bicolor - swamp white oak

**Fagaceae - beech family

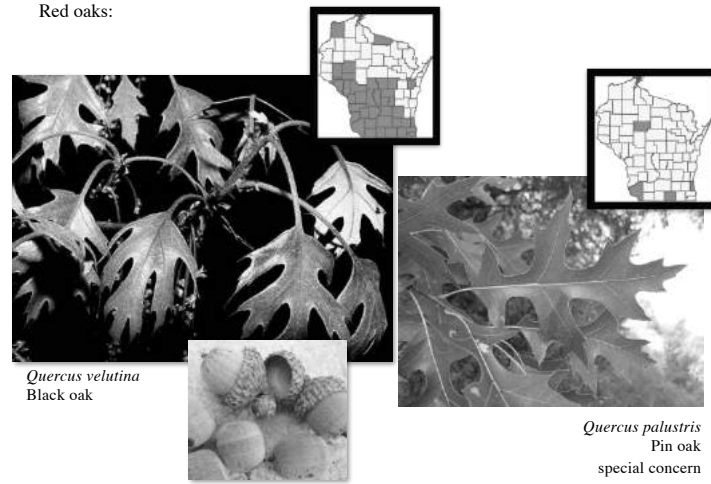
Red oaks:



Quercus rubra
Red oak

**Fagaceae - beech family

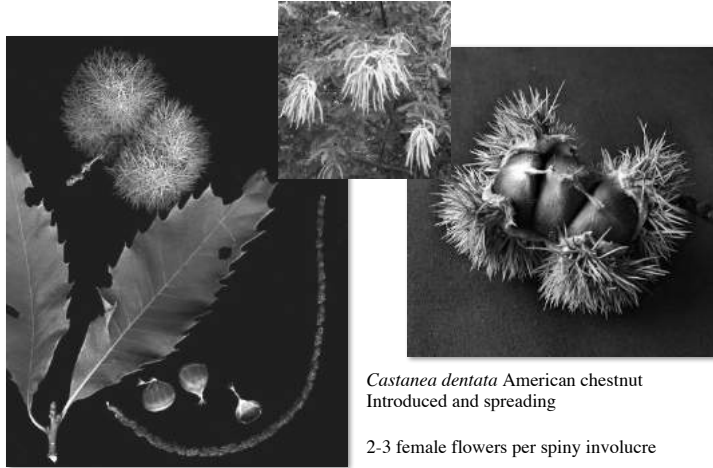
Red oaks:



Quercus velutina
Black oak

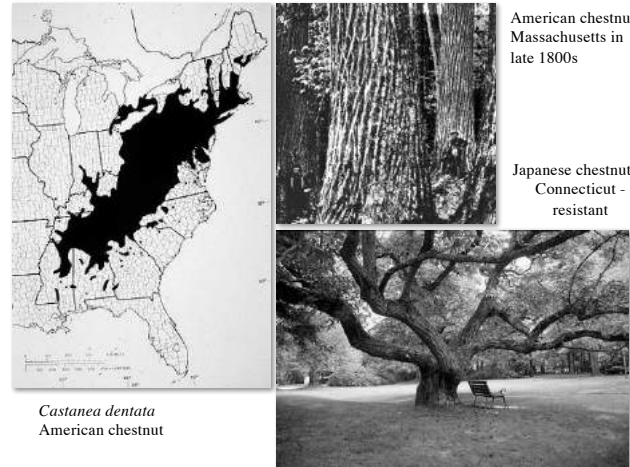
Quercus palustris
Pin oak
special concern

****Fagaceae - beech family**



Castanea dentata American chestnut
 Introduced and spreading
 2-3 female flowers per spiny involucre

****Fagaceae - beech family**

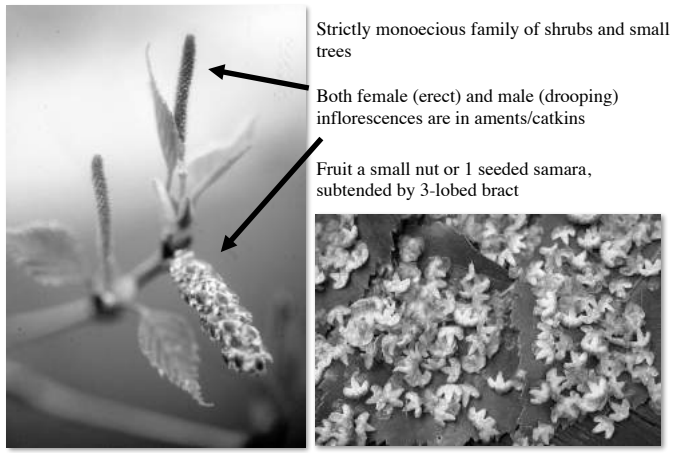


American chestnut
 Massachusetts in
 late 1800s

Japanese chestnut in
 Connecticut -
 resistant

Castanea dentata
 American chestnut

****Betulaceae - birch family**

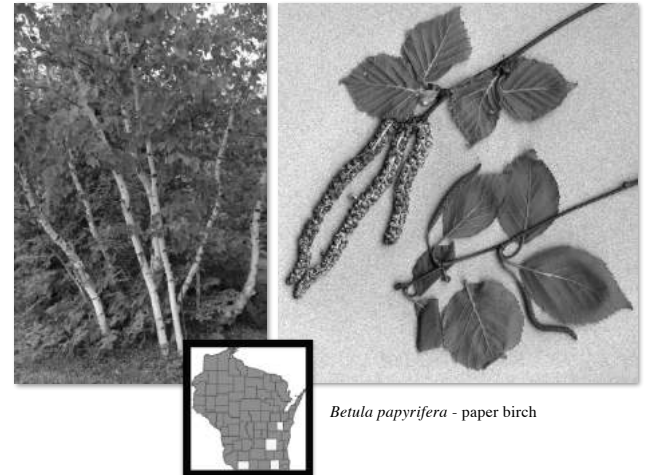


Strictly monoecious family of shrubs and small trees

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

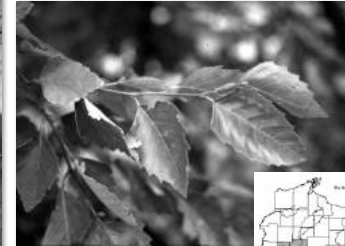
Betula allegheniensis
Yellow birch
Characteristic of northern hardwood forest;
requires rich humus of tree falls to
germinate; once prized veneer tree

****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 houndseed, 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
Hazel, 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

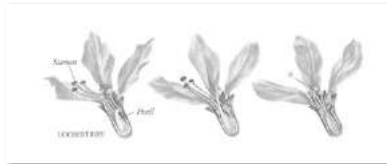
CA 4-6 CO 4-6 A 8-12 G (4)

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

- tristylly 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 \bar{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



Family often scented; 2 genera in Wisconsin



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

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



Geranium maculatum- wild geranium

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**



*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**



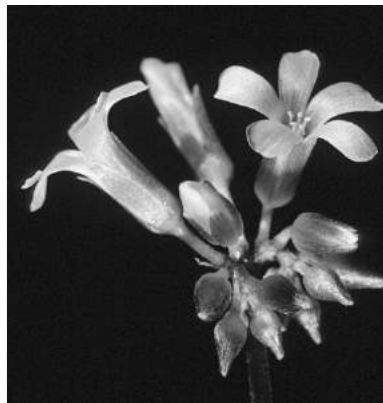
Family is both tropical and temperate with over 600 of the 900 species belonging to the genus *Oxalis*

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

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

Oxalis corniculata - creeping yellow wood sorrel

***Oxalidaceae - wood-sorrel family**



Oxalis stricta - tall wood-sorrel

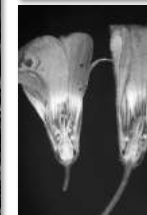
Flowers similar to wild geranium family, but each of the 5 carpels have ∞ seeds and produce capsules



***Oxalidaceae - wood-sorrel family**



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



Oxalis violacea
Violet wood sorrel

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

*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

