Conifers of the Great Lakes
By Robert Ayotte
Hjidden Lake Gardens
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Conifers of the Great Lakes

1. What is a gymnosperm?

2. Systematics

3. Overview of the Major Groups

4. Conifers of Michigan

5. Cone Quiz and Arboretum Walk
What is a Gymnosperm?

Two types of seed plants....

Gymnosperms

Angiosperms
What is a Gymnosperm?

Two types of seed plants....

**Gymnosperms** have ovules that become seeds, but they are not in ovaries that become fruits.

**Angiosperms**
What is a Gymnosperm?

Two types of seed plants....

Gymnosperms have ovules that become seeds, but they are not in ovaries that become fruits.

Angiosperms have flowers, which have ovaries with ovules in them that become, upon fertilization, fruits and seeds.
What is a Gymnosperm?

Two types of seed plants....

Gymnosperms - exposed seeds

Angiosperms - enclosed seeds
<table>
<thead>
<tr>
<th>Group</th>
<th>Subclass</th>
<th>Order</th>
<th>Family</th>
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</thead>
<tbody>
<tr>
<td>Cycads</td>
<td>Cycadidae (268)</td>
<td>Cycadales</td>
<td>Stangeriaceae</td>
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Source: Gymnosperm Database
www.conifers.org
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www.conifers.org
Conifers

- Secondary wood – vascular cambium
- Leaves – single with parallel veins, sometimes flattened scales
- Resin is produced in the wood or in the leaves, conducted through resin canals
- Compound cones
- Male pollen cones, female seed cones
- Conifers have one copy of a large inverted repeat in the chloroplast DNA, whereas all other plants studied so far have two copies.
Pinaceae

- 220-250 species worldwide.
- Pinaceae are supported as monophyletic by their protein-type sieve cell plastids, pattern of proembryogeny, and lack of bioflavonoids.
- The family often forms the dominant component of boreal, coastal, and montane forests.
- Major centers of diversity are found in the mountains of southwest China, Mexico, central Japan, and California.
Pinus strobus  White pine
Pinus resinosa  Red pine

Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE, A. A. Reznicek, E. G. Voss, & B. S. Walters.
**Pinus banksiana**  Jack pine

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Pinus banksiana  Jack pine

Kirtland’s Warbler
- Stands 80 ac in size
- Trees 8-21 years old
- On Grayling sand

Prescribed burn
- Target 210 acres
- Resulted in +/- 20,000 acres

Mack Lake Burn, 1980

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Picea glauca  White spruce

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Larix laricina  Eastern larch

Unless otherwise noted, all photos & range maps are from:
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Abies balsamea  Balsam fir

Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
Tsuga canadensis  Eastern hemlock

Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
Cupressaceae: Cypress Family

- 130-140 species worldwide
- Leaves: awl shaped or scalelike; Old leaves are not shed individually, but in small sprays of foliage
- Bark: red to orange brown with stringy texture
- Cones: The seed cones are either woody, leathery, or (in *Juniperus*) berry-like and fleshy, with one to several ovules per scale.
- Includes the old Taxodiaceae
Thuja occidentalis  N. white cedar

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MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
Juniperus communis  Ground juniper

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MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
Juniperus horizontalis  Creeping juniper

Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE, A. A. Reznicek, E. G. Voss, & B. S. Walters.
**Juniperus virginiana**  Red-cedar

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Juniperus virginiana  Red-cedar

Cedar-apple rust
Gymnosporangium juniper-virginianae

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Juniperus virginiana  Red-cedar

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Taxaceae: The Yew Family

• 30 species worldwide
• Many branched small trees and shrubs without resin canals
• Leaves evergreen: spirally arranged, often twisted to appear two-ranked
• The female cones are highly reduced, with just one ovuliferous scale and one seed
• As the seed matures, the ovuliferous scale develops into a fleshy aril partly inclosing the seed. The mature aril is brightly colored, soft, juicy and sweet, and is eaten by birds which then disperse the hard seed undamaged in their droppings
• The seeds are highly poisonous to humans, containing the poisons taxine and taxol
Taxus canadensis  Yew

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Non-native but common

**Pinaceae**
- White fir
- Co. blue spruce
- Norway spruce
- Austrian pine
- Ponderosa pine
- Scot’s pine
- Mugo pine
- Douglas-fir

**Abies concolor**

**Picea pungens**

**Picea abies**

**Pinus nigra**

**Pinus ponderosa**

**Pinus sylvestris**

**Pinus mugo**

**Pseudotsuga menziesii**

**Cupressaceae**
- Bald cypress

**Taxodium distichum**

**Taxaceae**
- Japanese yew

**Taxus cuspidata**

Numerous genera, species and cultivars