

A photograph of a dense forest of tall, green coniferous trees, likely spruce or fir, under a clear blue sky. The trees are the central focus, with their dark green needles contrasting against the bright sky. The lighting suggests a sunny day, with some highlights on the tree tops.

Conifers of the Great Lakes

By Robert Ayotte

Hidden Lake Gardens

01/30/2018

Conifers of the Great Lakes

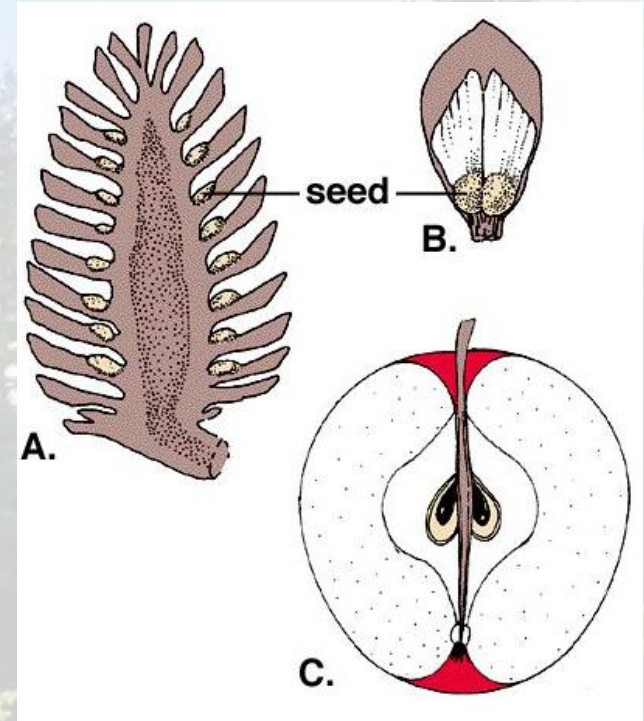
1. *What is a gymnosperm?*
2. *Systematics*
3. *Overview of the Major Groups*
4. *Conifers of Michigan*
5. *Cone Quiz and Arboretum Walk*

What is a Gymnosperm?

Two types of seed plants....

Gymnosperms

Angiosperms

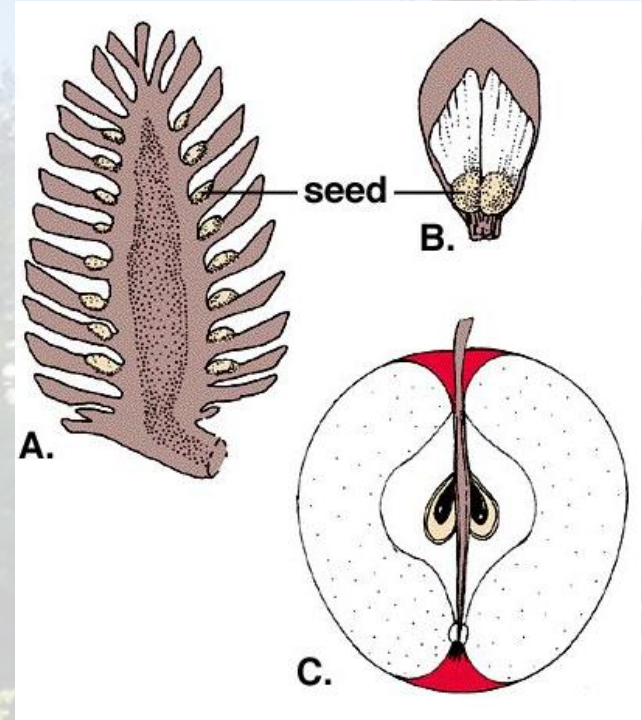


What is a Gymnosperm?

Two types of seed plants....

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

Angiosperms

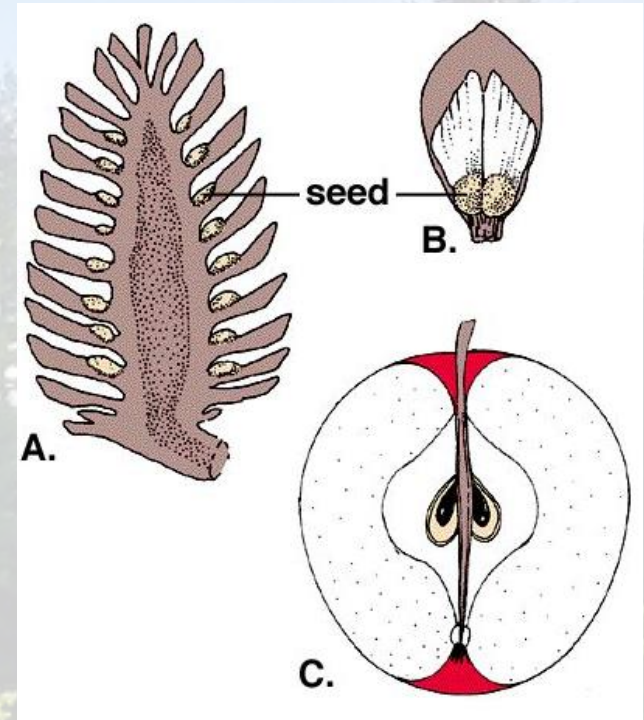


What is a Gymnosperm?

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.

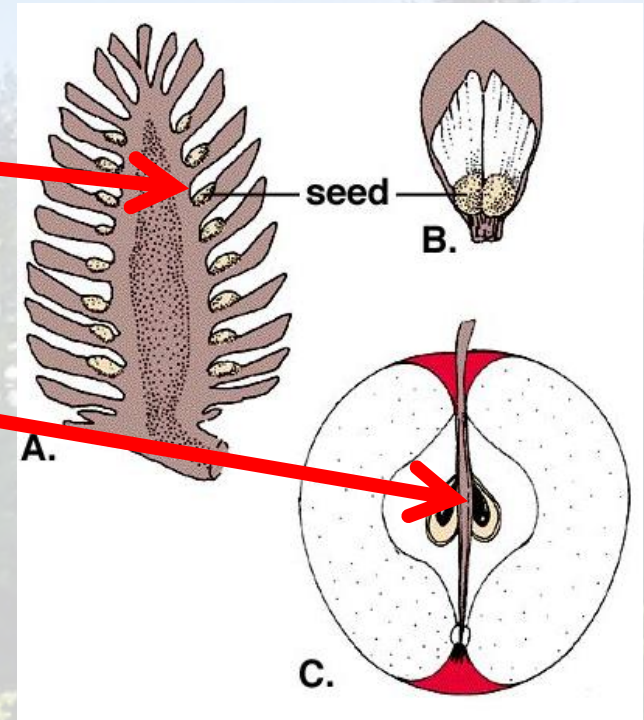


What is a Gymnosperm?

Two types of seed plants....

Gymnosperms - exposed seeds

Angiosperms - enclosed seeds



Four Major Groups

	<u>Subclass</u>	<u>Order</u>	<u>Family</u>
Cycads	Cycadidae (268)	Cycadales	Cycadaceae Stangeriaceae Zamiaceae
Ginkgo	Ginkgoidae (1)	Ginkgoales	Ginkgoaceae
Gnetophytes	Gnetidae (68) Gnetales Ephedrales	Welwitschiales	Welwitschiaceae Gnetaceae Ephedraceae
Conifers	Pinidae (589) Araucariales Cupressales	Pinales	Pinaceae Araucariaceae Podocarpaceae Sciadopityaceae Cupressaceae Cephalotaxaceae Taxaceae

Source: *Gymnosperm Database*
www.conifers.org

Four Major Groups

	<u>Subclass</u>	<u>Order</u>	<u>Family</u>
Cycads	Cycadidae (268)	Cycadales	Cycadaceae Stangeriaceae Zamiaceae
Ginkgo	Ginkgoidae (1)	Ginkgoales	Ginkgoaceae
Gnetophytes	Gnetidae (68) Gnetales Ephedrales	Welwitschiales	Welwitschiaceae Gnetaceae Ephedraceae
Conifers	Pinidae (589) Auracariales Cupressales	Pinales	Pinaceae Araucariaceae Podocarpaceae Sciadopityaceae Cupressaceae Cephalotaxaceae Taxaceae

Conifers

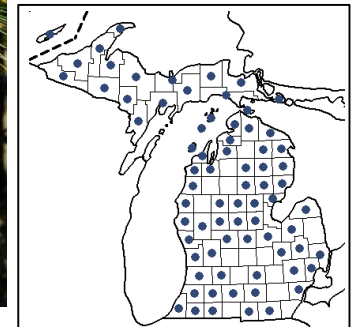
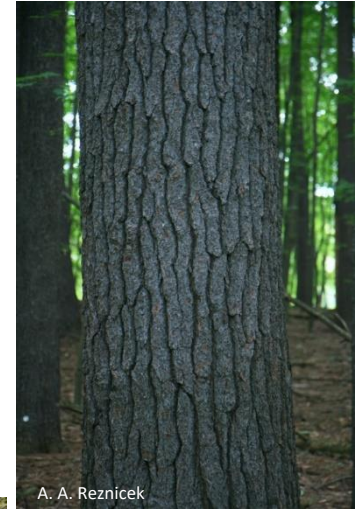
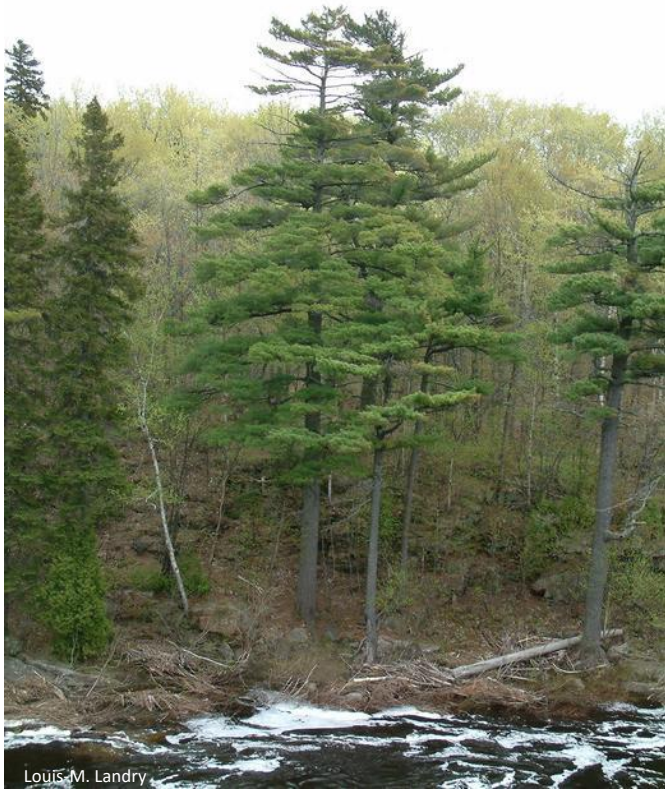


- Secondary wood – vascular cambium
- Leaves – single with parallel veins, sometimes flattened scales
- Resin is produced in the wood or in the leaves, conducted through resin canals
- Compound cones
- Male pollen cones, female seed cones
- Conifers have one copy of a large inverted repeat in the chloroplast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

Pinaceae

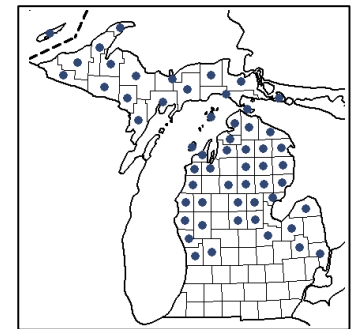
- 220-250 species worldwide.
- Pinaceae are supported as monophyletic by their protein-type sieve cell plastids, pattern of proembryogeny, and lack of bioflavonoids.
- The family often forms the dominant component of boreal, coastal, and montane forests.
- Major centers of diversity are found in the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

Pinus strobus White pine



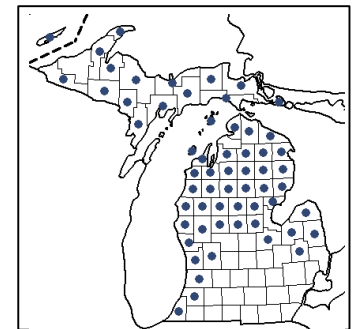
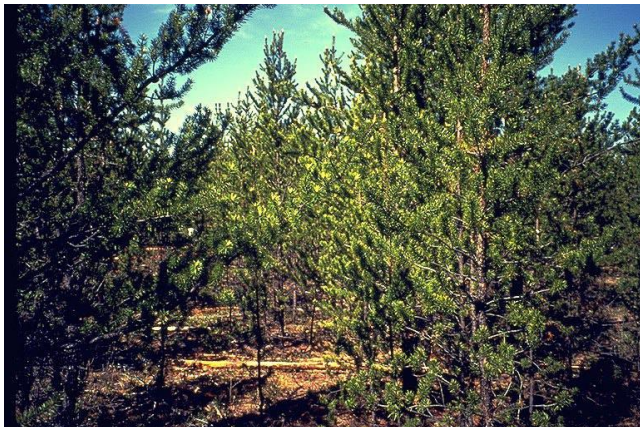
Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

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.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

Pinus banksiana Jack pine



Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

Pinus banksiana Jack pine



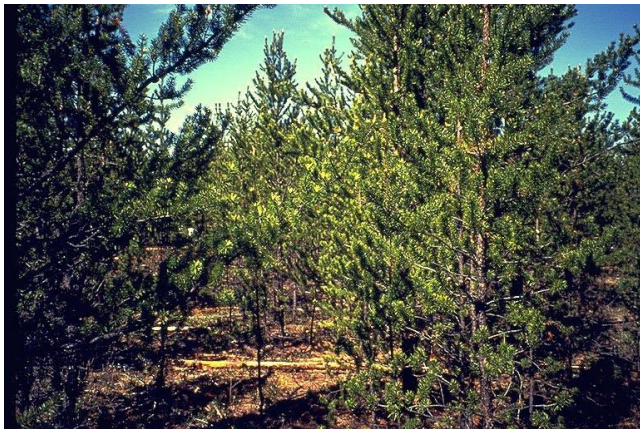
Kirtland's Warbler

Kirtland's Warbler

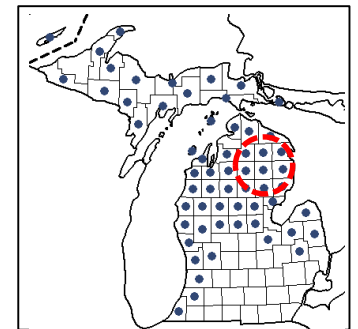
- Stands 80 ac in size
- Trees 8-21 years old
- On Grayling sand

Prescribed burn

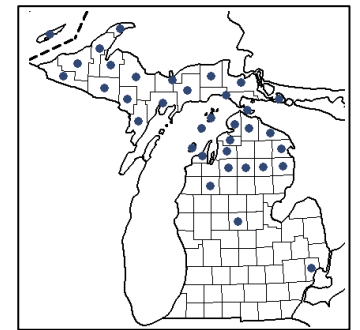
- Target 210 acres
- Resulted in +/- 20,000 acres



Mack Lake Burn, 1980

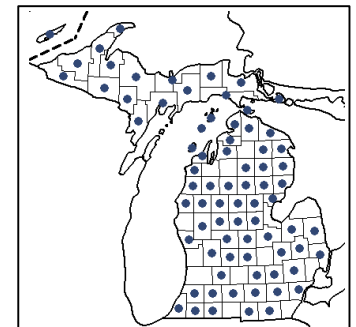


Picea glauca White spruce



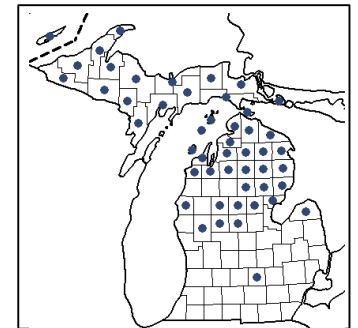
Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

Larix laricina Eastern larch



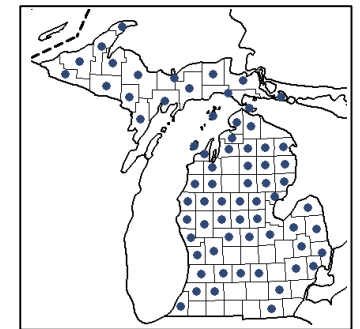
Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

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.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

Tsuga canadensis Eastern hemlock

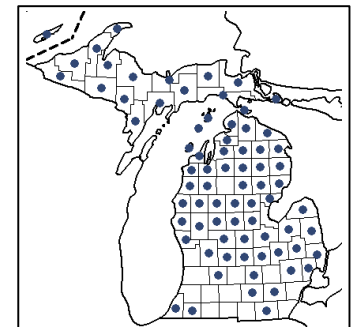


Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

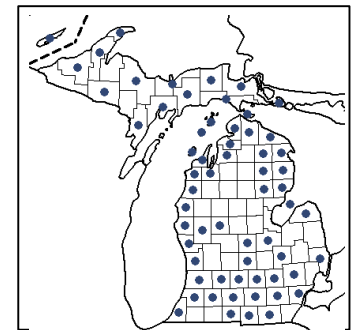
Cupressaceae: Cypress Family

- 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

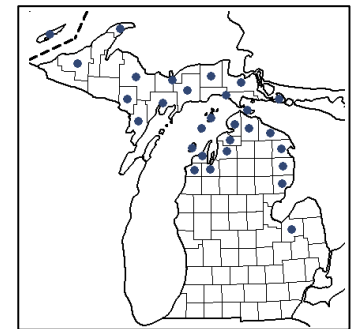


Juniperus communis Ground juniper



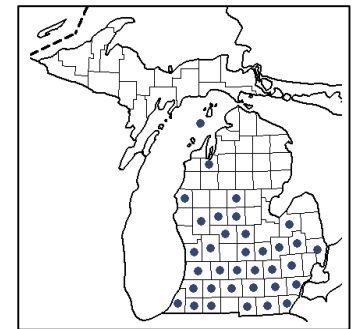
Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

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.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

Juniperus virginiana Red-cedar

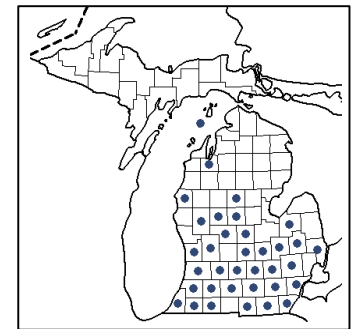


Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

Juniperus virginiana Red-cedar

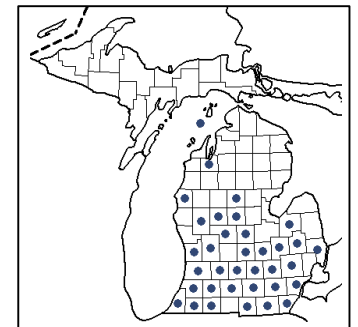


Cedar-apple rust
Gymnosporangium
juniper-virginiana



Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

Juniperus virginiana Red-cedar

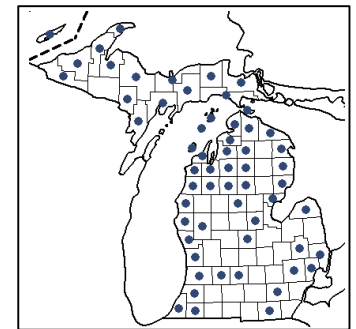


Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

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



Unless otherwise noted, all photos & range maps are from:
MICHIGAN FLORA ONLINE. A. A. Reznicek, E. G. Voss, & B. S. Walters.
February 2011. University of Michigan. Web. January 8, 2013.
<http://www.michiganflora.net/species.aspx?id=889>.

Non-native but common

Numerous
genera, species
and cultivars

Pinaceae

White fir

Abies concolor

Co. blue spruce

Picea pungens

Norway spruce

Picea abies

Austrian pine

Pinus nigra

Ponderosa pine

Pinus ponderosa

Scot's pine

Pinus sylvestris

Mugo pine

Pinus mugo

Douglas-fir

Pseudotsuga menziesii

Cupressaceae

Bald cypress

Taxodium distichum

Taxaceae

Japanese yew

Taxus cuspidata



