

Beginning Farmer 150 Farm Woodlot Management – Assessing Enterprises

- Welcome
- The course
- Teachable
 - Pre-survey
 - Mailing survey
- Comfort with Zoom
 - Default audio “off”
 - If questions...
- Let’s go, lecture 1



BF 150 Lecture #1



An Introduction to the Identification and Ecology of Typical Northeastern Forest Tree Species

Peter J. Smallidge
NYS Extension Forester and Director,
Arnot Teaching and Research Forest
pjs23@cornell.edu
www.ForestConnect.info
<http://CornellForestConnect.ning.com>



Cornell University
Cooperative Extension



Acknowledgement

www.forestryimages.org

https://www.srs.fs.usda.gov/pubs/misc/ag_654/table_of_contents.htm
(search “silvics manual”)

Know Your Trees:

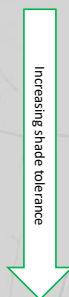
<http://ecommons.library.cornell.edu/retrieve/113/art.pdf>

<http://bhort.bh.cornell.edu/tree/trees.htm>

Trees of New York: Native and Naturalized. Don Leopold, Syracuse University Press.

Today’s Learning Objectives

- List
 - tree identification learning skills
 - features of hardwoods that aid identification
- Understand differences among common trees for particular habitats and ecological features
- Know two best recognizable features (BRF) of at least 5 trees
- quaking aspen
- paper birch
- black cherry
- eastern white pine
- white ash
- red oak
- white oak
- red maple
- sugar maple
- American beech
- eastern hemlock



Fact sheet “Features of trees useful for tree identification”

(see handout on Course Page)

- Match descriptive with visual (e.g.)
 - Arcuate veination
 - Two-ranked needles
- Some features vary more than others
 - Leaves > bark > twigs > fruit
- Manage terminology
 - e.g., serrate, crenate, attenuate, emarginate, orbicular
- Learn to use dichotomous keys
 - e.g., needles borne in clusters vs. needles borne singularly
 - “Know Your Trees



How to Learn Trees

- *Flowers* – inaccessible, transient, definitive
- *Fruit* – result from flowers, sometime accessible
- *Twigs* – more useful in hardwoods than conifers
- *Foliage* – conifer yes, hardwoods variable
- *Bark* – diagnostic for some species
- *Crown architecture* – diagnostic for a few species
- *Habitat* – often helps sort within a genus
- *Shade tolerance* – helps narrow the possibilities of seedlings and saplings (all species can survive in sunlight, only some in shade)

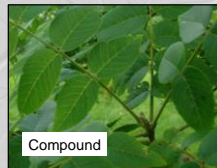
Leaf Arrangement

- Buds form into leaves, twigs and flowers
- Hardwood leaf arrangement is opposite, alternate or whorled.



Leaf Type

- Buds form in early summer.
- Each leaf has a bud (next year's leaf) at the base of the leaf on the twig.
- Leaves (simple) have a bud at the base of the petiole (the stalk)
- Leaves (compound) have a bud at the base of the rachis, which supports multiple leaflets.



quaking aspen *Populus tremuloides*

- Poplars and cottonwoods
- quaking, trembling
- bigtooth
- eastern cottonwood
- balm-of-gilead, balsam poplar
- relatively soft wood, low BTU, shade intolerant, early successional and disturbance dependent



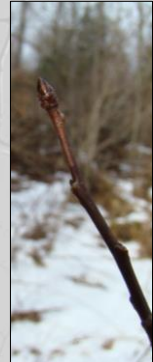
Howard F. Schwartz, Colorado State University, Bugwood.org

quaking aspen *Populus tremuloides*



Paul Wray, Iowa State University, Bugwood.org

BRF – buds alternate glabrous, without hairs, unlike bigtooth aspen.



quaking aspen *Populus tremuloides*



Steven Katovich, USDA Forest Service, Bugwood.org



Dave Powell, USDA Forest Service, Bugwood.org



Keith Kanoti, Maine Forest Service, Bugwood.org

quaking aspen *Populus tremuloides*

- **BRF** (genus): flattened petiole, shade intolerant, root suckers
- **BRF**: small teeth on leaf margin, flattened petiole moist soil, glabrous bud scales
- Won't self replace without major disturbance
- Clonal vegetative reproduction, sprouts die in the shade
- Seeds need mineral soil, fast growth, dies young (60 - 80 yrs).
- Used for paper, chip board, internal wood trim, good lumber is decent, but no soil contact. Low BTU for firewood.
- Wildlife eat buds/flowers, rotten wood for cavities
- Forest tent caterpillars, hypoxylon canker, among others

paper birch *Betula papyrifera*

Betula spp.

- paper, white birch
- sweet, black birch
- yellow birch
- gray birch
- river birch

Betulaceae

- birches
- eastern hophornbeam
- American hornbeam
- hazelnut



5349047

Keith Kanoti, Maine Forest Service, Bugwood.org

paper birch *Betula papyrifera*



The birch family has double serrations = big notches and little notches (eastern hophornbeam)

5349047

Keith Kanoti, Maine Forest Service, Bugwood.org



Clustered leaves, doubly serrate

paper birch *Betula papyrifera*

Joseph O'Brien, USDA Forest Service, Bugwood.org

paper birch *Betula papyrifera*

Steven Katovich, USDA Forest Service, Bugwood.org

paper birch *Betula papyrifera*

- **BRF** (family): doubly serrate leaf margin (*Betula*, *Ostrya*, *Carpinus*, *Corylus*)
- **BRF**: white exfoliating bark
- Early successional, disturbance responsive species
- Mineral soil required for seed germination, or stump/log
- Ecologically similar to quaking aspen
 - Fast early growth, shade intolerant, dies young
- No clonal reproduction, often sprouts from stumps when cut
- Used for pulp-paper. Decent (mediocre) firewood, not "hardwood" firewood.

black cherry *Prunus serotina*

- Rose family (apple, plum, rose)
 - (wild) black cherry
 - fire, pin cherry
 - bird, sweet mazzard cherry
 - choke cherry (clonal shrub)
- Glands on petiole define the genus *Prunus*

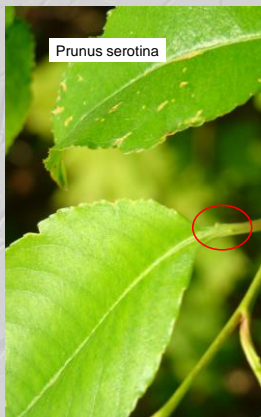


5342032
Keith Krupar, Illinois Forest Service, Burgwood.org

Early season mid-rib



Prunus serotina



Prunus virginiana



black cherry *Prunus serotina*



black cherry *Prunus serotina*



black cherry *Prunus serotina*

Scratched twig is odiferous. Hydrogen cyanide. Wilted foliage dangerous to livestock.



Paul Wray, Iowa State University, Bugwood.org

black cherry *Prunus serotina*



Keith Kanoli, Maine Forest Service, Bugwood.org



Brian Lockhart, USDA Forest Service, Bugwood.org

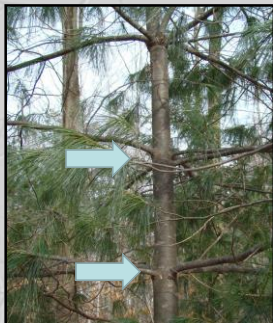
black cherry *Prunus serotina*

- **BRF** (genus): paired glands [variable] on leaf base or distal end of petiole
- **BRF**: pubescence on lower midrib of vigorous leaves *sometimes*, singly serrate leaf margin, fleshy fruit with pit, "burnt potato chip bark", bitter almond smell & taste.
- Hydrogen cyanide from drying foliage
- Highly valued wood (of good form and quality)
- Early successional, full sun for best development and survival
- Wildlife eat fruits, mast crops every 1 to 5 years
- Rose family, eastern tent caterpillar (has the "tent")

Eastern white pine – *Pinus strobus*



Eastern white pine – *Pinus strobus*



Eastern white pine – *Pinus strobus*



Eastern white pine – *Pinus strobus*



White Pine Weevil – Symptoms



Eastern white pine – *Pinus strobus*

- **BRF:** 5-needle, fascicle sheath deciduous, longest cone of northeastern pines, soft textured branches
- Maritime through Lake States into southern Appalachians
- Often on well to excessively well drained soils. Hummocks in swamps. On moister soils without hardwood competition.
- Colonizes old fields
- Intermediate shade tolerance
- White pine weevil and white pine blister rust

white ash *Fraxinus americana*

- white ash
- green ash
- black ash
- blue ash



- Compound leaves, usually
- Opposite leaves (and leaflets)
- M.A.D., all have opposite leaves



Paul Wray, Iowa State University, Bugwood.org

UGA0008491

white ash *Fraxinus americana*



Keith Kanoff, Maine Forest Service,
Bugwood.org

5349064



white ash *Fraxinus americana*



Ashy gray outer and inner
scuffed bark. Walnut has dark
bark when scuffed.



white ash *Fraxinus americana*



Emerald ash borer, adult

www.emeraldashborer.info



EAB, larval S-shaped gallery

white ash *Fraxinus americana*

- **BRF** (genus): opposite compound leaves (also boxelder, a maple), velvety bud scales
- **BRF**: round twig with “v-notch” leaf scar, distal half of leaf margin is serrate, wing covers ~ 1/3 of seed, maroon/burgundy fall color, well-drained but moist soil
- Tolerant becoming intolerant
- Moderate life span, dioecious, frequent mast crops
- Usually decent form, potentially high volume/acre
- Emerald ash borer...the big (and very scary) news!!!
 - www.emeraldashborer.info

northern red oak *Quercus rubra*

- Fact sheet
- red oak subgenus
 - northern red
 - black
 - pin
 - scarlet
 - Shumard
- Bristle tip foliage
- Dark-colored bark
- Acorn meat bitter
- Xylem pores not plugged
- Sharp pointed buds
- Stellate pith in cross section (if you have an imagination)



The Dow Gardens Archive, Dow Gardens, Bugwood.org

00A3143014

northern red oak *Quercus rubra*



Acorn cap 1/4 length of nut
Qr acorns on 2nd year twig
Terminal buds clustered – all Quercus



northern red oak *Quercus rubra*



northern red oak *Quercus rubra*



Inner bark pinky-peach colored - NRO
Inner bark sulfur yellow colored - BLO



northern red oak *Quercus rubra*

- **BRF** (genus): foliage usually "lobe and sinus" (except shingle oak, live oak, willow oak), buds clustered on terminal
- **BRF** (subgenus): lobes bristle-tipped, acorns mature over two years, bark dark, typically mesic to dry sites (except pin oak)
- **BRF**: shallow acorn cap, "ski-tracks" in mature bark, peach colored inner bark (vs. black oak), stem self-prunes
- Intolerant to intermediate, regenerates best in partial to nearly full sun, mast crops vary locally but every 3 to 5 years. Fruit matures in 2 years (anticipate seed crop)
- Heavily damaged by gypsy moth in 80's and 90's
- Valuable attractive wood, coarse grained, good BTUs

white oak *Quercus alba*

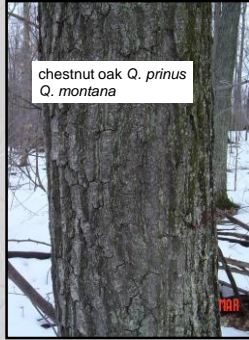
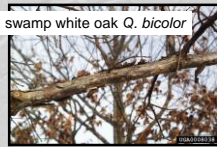
- white oak subgenus
 - white
 - chestnut
 - swamp white
 - bur
- Rounded lobes
- Ashy gray bark
- "Sweet" acorn meat, one year to mature
- Blunt buds
- Stellate pith in cross section



swamp white and chestnut oak



Paul Wray, Iowa State University, Bugwood.org

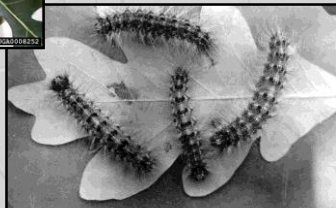


white oak *Quercus alba*



Acorn cap is warty, usually $\frac{1}{4}$ length of nut.

Paul Wray, Iowa State University, Bugwood.org



USDA Forest Service Archive, USDA Forest Service, Bugwood.org

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white oak *Quercus alba*



white oak *Quercus alba*

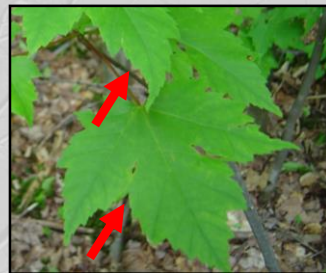
Of all species, *Q. alba* may have the most variation in bark

white oak *Quercus alba*

- **BRF** (genus): foliage usually lobe and sinus (shingle oak, live oak, willow oak), buds clustered on terminal
- **BRF** (subgenus): lobes rounded, acorns mature in one year, bark dark, very wet to very dry sites, "sweet" acorn meat
- **BRF**: oblong acorn with coarse deep cap, small round buds, ashy gray highly variable bark, dry sites
- Intermediate shade tolerant, xylem plugged with tyloses (wine, bourbon and scotch barrels)
- Mast crops 4 to 6 year interval
- Increasingly common with pines and on drier soils and regions
- Previous heavy infestation by gypsy moth

red maple *Acer rubrum*

- Maples
 - red (spring)
 - silver (spring)
 - sugar (fall)
 - black (fall)
 - Norway (fall, invasive)
 - striped (fall)
 - mountain (fall)
 - boxelder (fall, compound leaves)
 - Not genus + *acerifolium*
 - *Viburnum*, *Platanus*
- Opposite, typically simple leaves (except *A. negundo*)

red maple *Acer rubrum*

striped maple

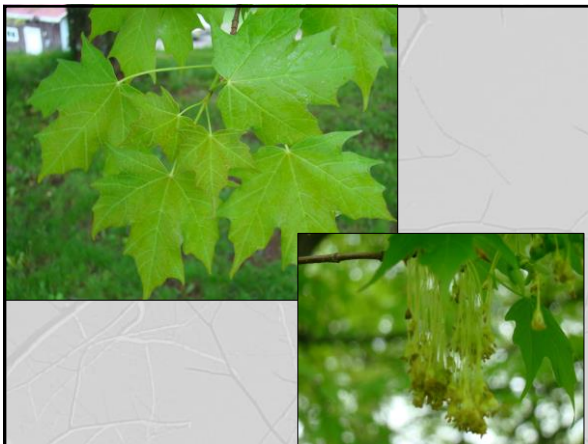
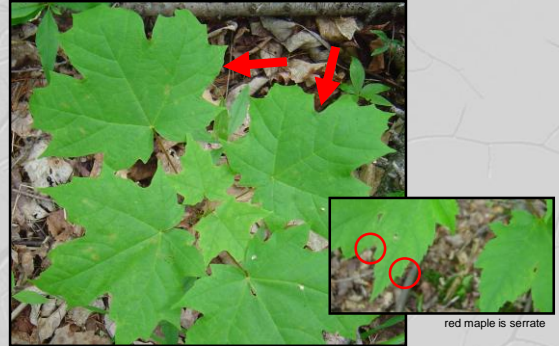
red maple *Acer rubrum*



red maple *Acer rubrum*

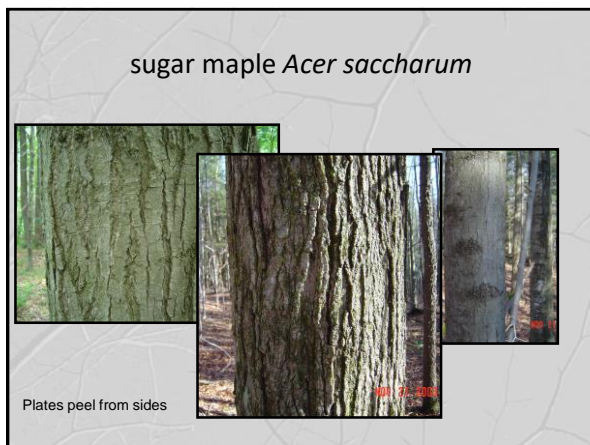
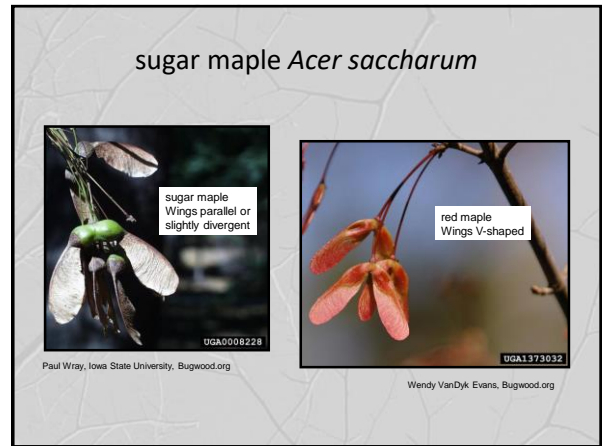
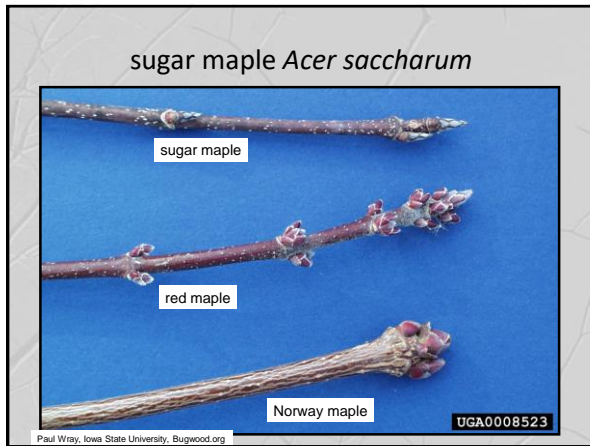
- **BRF** (genus): opposite, simple (except boxelder), palmately lobed
- **BRF**: reddish twigs, reddish rounded buds, flowers; coarse but flaky bark (compared to sugar maple); fruit in spring
- Intermediate in shade tolerance, sometimes beautiful fall color
- Often on the dry or wet sides of sugar maple habitat
- Spring fruit (wildlife); colonizes abandoned agric fields
- Attractive wood, but difficult to attain good grade
- Maple syrup
- Poor compartmentalization of decay

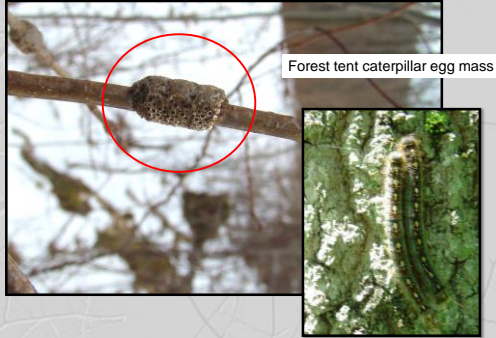
sugar maple *Acer saccharum*



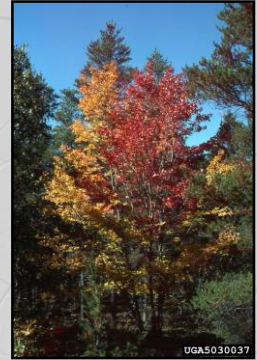
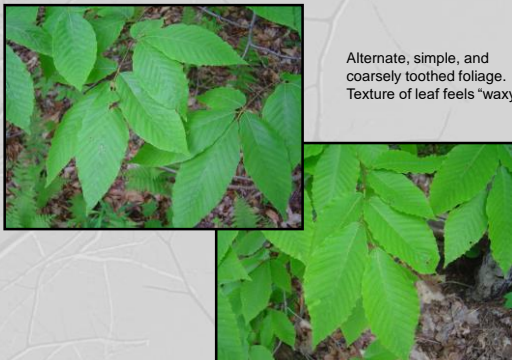
sugar maple *Acer saccharum*





sugar maple *Acer saccharum*sugar maple *Acer saccharum*

- **BRF:** sharp pointed buds, smooth leaf margin and rounded sinus, samara wings "parallel" (fruit), tight and hard bark
- Shade tolerant, preferentially browsed
- Mast seed crops 2 – 4 years. Tends to follow drought years.
- Valuable wood
- Maple syrup, cream, sugar, cotton candy, kombucha, chocolate, wine, sports gel, etc.
- Several fungi and insects (Asian long-horned beetle)

American beech *Fagus grandifolia*American beech *Fagus grandifolia*

American beech *Fagus grandifolia*



Bill Cook, Michigan State University, Bugwood.org

American beech *Fagus grandifolia*



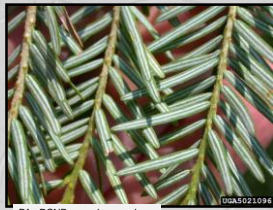
American beech *Fagus grandifolia*



American beech *Fagus grandifolia*

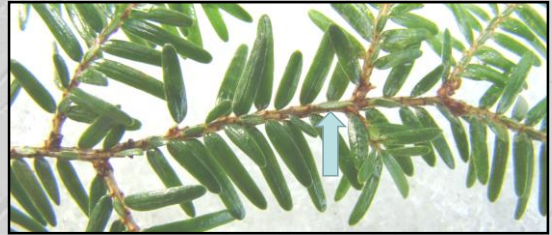
- **BRF:** elongated sharp buds, waxy leaves, singly serrate, smooth gray bark until BBD arrives.
- Very shade tolerant and low deer browsing preference
- Mast seed crops on 5- to 7-year cycle
- Hard wood, butcher blocks, interior trim, rail road ties, firewood
- Reproduces sexually and asexually; not browsed; stump sprouts, and root suckers can be sufficiently prolific to exclude desired hardwoods

ForestConnect "beech ecology and management" fact sheet

Eastern hemlock – *Tsuga canadensis*

PA - DCMR, www.bugwood.org

USA2021095

Eastern hemlock – *Tsuga canadensis*Eastern hemlock – *Tsuga canadensis*

Keith Kandori, www.bugwood.org

5349051

Eastern hemlock – *Tsuga canadensis*

Bill Cook, www.bugwood.org

USA1218066



Eastern hemlock – *Tsuga canadensis*



Eastern hemlock – *Tsuga canadensis*

- **BRF**: two ranked singular foliage with inverted upper twig needle, purple bark striations, persistent branches
- Maritime provinces, New England, Lake States, along Appalachians to northern Georgia
- Not overly sensitive to soils, but typically moist with good drainage
- Riparian zones, ravines, and moist flats.
- Mixed with sugar maple, beech, and yellow birch (Hemlock – northern hardwoods)
- Can establish in recent heavy cuts, but dominates as late successional species
- The most shade tolerant conifer = American beech. Capable of slow growth
- Hemlock wooly adelgid

In Closing...

- Tree ID is fun!!
- Find the right field guide for you
- Make a collection of twigs, fruits, etc. and practice
- Make flash cards
- Use all five senses (with caution)
- Structure your learning vs. independent memorization
- Accumulate knowledge through time