

WHAT'S SO GREAT ABOUT A TREE?

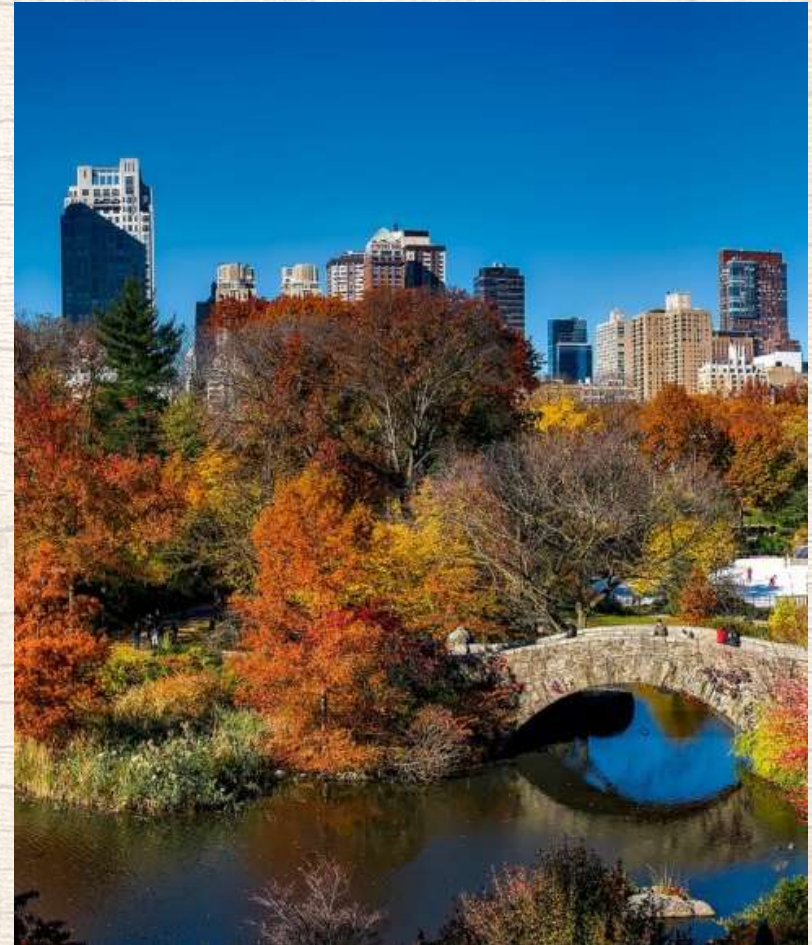


www.treerewal.com

Mary Alexander
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Lifetime Learning Institute
September 26, 2023

Why Should I Care About a Tree?

- Boosts mental & physical health – lowers stress
- Provides shade – natural AC reduces “urban heat island” and glare
- Moderates ground temperatures
- Cleans out greenhouse gases and purifies air so we breathe more easily
- Provides oxygen and moisture to air we breathe
- Filters water by soaking up soil pollutants, i.e., cadmium, chromium, nitrate & lead



Why Should I Care About a Tree?

- Provides food, medicine, raw materials & shelter to wildlife, i.e., squirrels, birds, bats, bees, butterflies, fireflies, etc.
 - Add one tree to open pasture increases bird biodiversity from 0-80
 - Oaks can provide up to 10,000 nuts/yr
 - Oaks support 800+ caterpillar species & 600+ wasps and sawflies
 - Important source of pollen for pollinators
- Decaying wood provides nitrogen to soil and food for fungi, lichen, mosses, insects, amphibians and birds



Photo: Jayne Boyer



Photo: Jayne Boyer



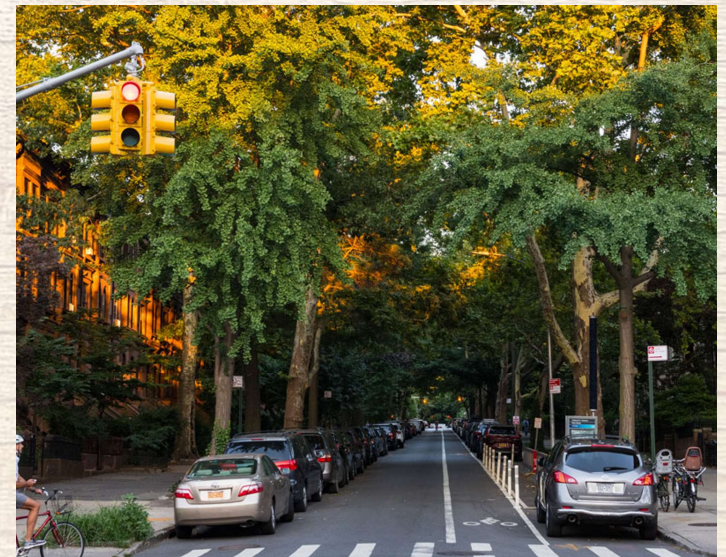
Photo: Jayne Boyer

Why Should I Care About a Tree?

- Holds soil together to limit flash flooding & landslides
- Creates windbreaks & street noise buffers
- Reduces crime & raises property values by
 - More people out in green space
 - Conveys message **“Neighborhood Cares”**



@ Ian Shive



@ Diane Cook & Len Jenshel

Why Should I Care About a Tree?

- Native American mythology based on natural world beliefs
- Fun – swings, wood carvings, lighting
- Source for paper, lumber, sports equipment, furniture, door handles, etc.



<https://www.pinterest.com/pin/163537030189183596/>



<http://regenglish11.blogspot.com/2012/09/native-american-oral-traditions.html>



Photo: Jayne Boyer



<https://baseball.epicsports.com/images/detail/109266/view.html>



<https://www.joshcarteart.com/listing/836512679/wood-carving-wood-spirit-carving-wood>

History of Development of Trees

- Evolved separately from plants
- Tree-like plant with vascular system to hold self up (-400 M)
- Before trees, 26 ft tall fungi during Middle Devonian (-385 M)
- Earliest were tree ferns in Carboniferous period (-360 M)
- First trees ginkgos & conifers in Triassic period (-200 M)
- Flowering plants in Cretaceous period (-125 M)
- Palm trees (-70 M)
- Eastern forests, after last ice age, spread north from Cades Cove area in Smoky Mountains

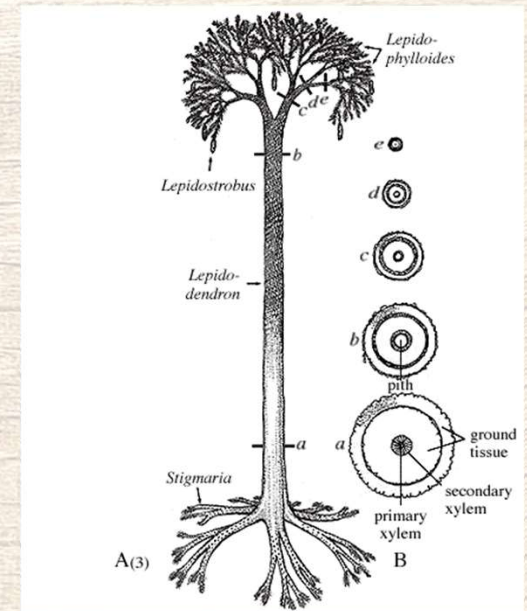
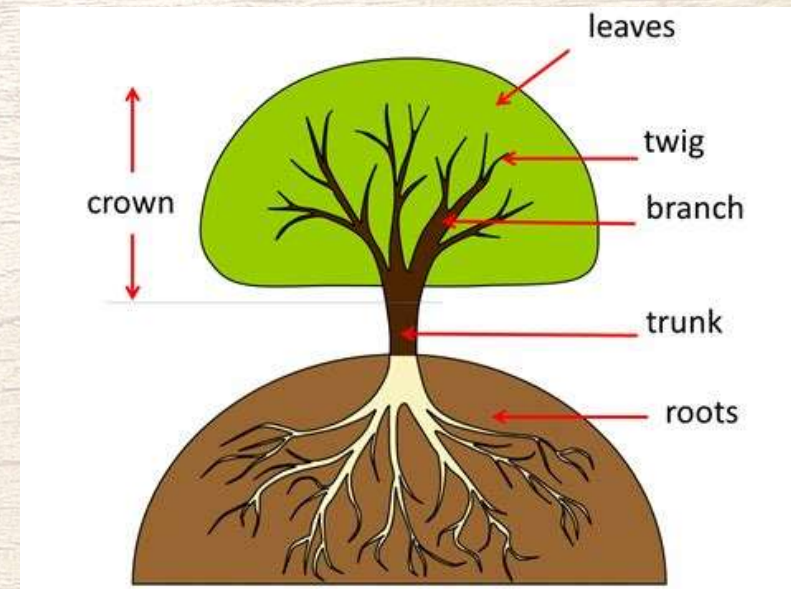


Image from U. of CA Paleontology website

Tree Description

- Long-lived perennial woody plant on single stem
- Roots – Size of crown
 - Most in top 18" of soil
 - Absorb water & nutrients
 - Store excess carbohydrates
 - Symbiotic home for mycorrhizal fungi
 - Anchor for Biomass
 - Provide air (bald cypress)
 - Filter salt (mangroves)
- Trunk(s) – Grow by adding new wood outwards – growth rings
 - Bark
 - *Xylem and phloem*
 - Cambium
 - Heartwood
 - Lenticels for oxygen & CO₂
- Branches & Twigs – Allow leaf exposure to sun
- Leaves – Make food thru photosynthesis using CO₂



Statistics

- 3 trillion trees current exist
- 60,000 – 100,000 tree species, 25% of all plant species
- Nearly 58% of species in single countries, i.e., Brazil, Colombia & Indonesia
- Mature leafy tree produces oxygen for 2-10 people a year
- Confirmed oldest tree (Methuselah) - Bristlecone pine in California at 4,855+ years old
- Oldest colony – Aspen Grove in Utah is 80,000+ years old



https://www.reddit.com/r/natureismetal/comments/kcjvvn/methuselah_a_4852_year_old_great_basin/

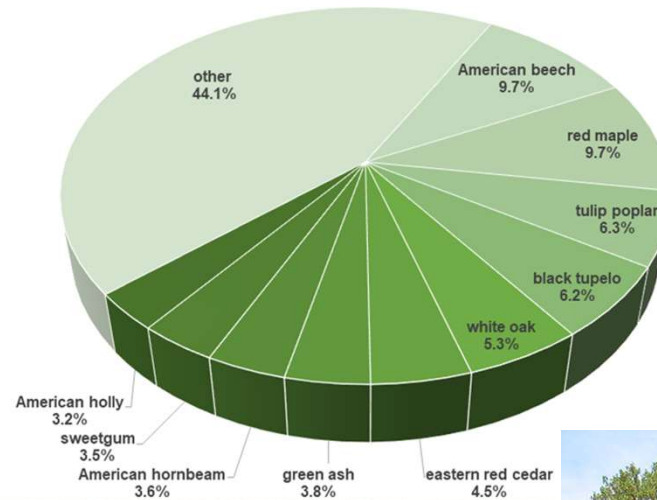


<http://www.businessinsider.com/pando-aspen-grove-utah-oldest-largest-organism-2016-7>

Tree Statistics – Fairfax County

- Tree cover is 57%
- Most Common
 - American Beech
 - Red Maple
 - Tuliptree
- Remove 4.54 tons of pollution/yr
- Produce 233 tons of oxygen/yr
- Provide building energy savings of \$34+ M/yr
- Fairfax City Designated Tree City USA for 35 years
- 2008 American plum tree designated “national champion”

Tree Species Composition in Fairfax County 2017



Human Impact

- Climate Change & Global Warming
- Deforestation
- Illegal Logging
- Fires
- Improper Care
- Invasive Plants
- Diseases & Parasites



www.geod.psu.edu

Climate Change & Global Warming

Heat & drought create stress on tree

- Lose leaves to save energy
- Oaks drop green immature acorns to save energy
- More susceptible to insects (caterpillars, beetles, mites & aphids)



www.farmersalmanac.com



https://www.inaturalist.org/guide_taxa/926919



https://canr.msu.edu/news/tough_time_for_trees_heat_drought_and_storms_take_their_toll

Deforestation

- Since 10,000 BC, man has cleared 46% of all trees
- In past 20 years, the world has lost 16% of tree cover
- In 2022, overall forest destruction rose by 10% in one year
 - Brazil and Indonesia get most publicity over deforestation
 - In 2021, Amazon rainforest lost 5,100+ sq mi (size of Connecticut)

BUT, countries with biggest losses are:

- Honduras – Has lost 84% of its historic forest (was 100% covered)
- Nigeria – Has lost 90% of its historic tree cover (was 50% covered)
- The Philippines – Has lost 65% of its historic forest (was 100% covered)



<https://en.mercopress.com/2019/11/19/record-deforestation-in-the-amazon-rainforest-confirms-official-brazilian-data>

Illegal Logging

- Forests home to 80% of world's remaining land-based biodiversity
- More than one in four people relies on forest resources for their livelihoods
- Illegal logging accounts for
 - 15% - 30% of global timber trade & rise to
 - 50% to 90% of the trade from tropical countries
- Economic value of (including processing) worth \$30 - \$100 Billion
- Most profitable natural resource crime on planet



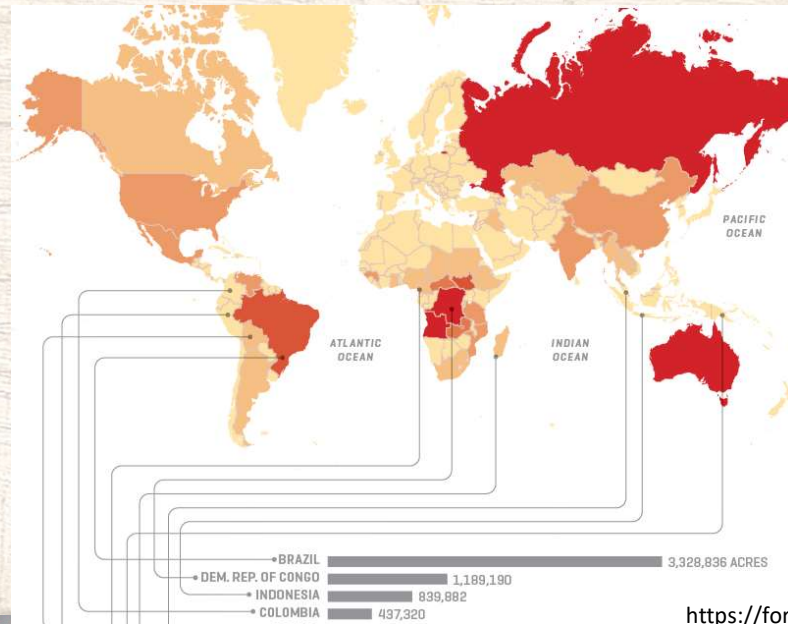
<https://www.bbc.com/indonesia/dunia-52889370>



<https://rmn.ph/kampanya-sa-illegal-logging-pinaigting-ng-penro-isabela/>

Fires

- Fires now accounted for more than 25% of all tree cover loss over the past 20 years, a 100% increase
- Extreme wildfires are forecast to increase 30% by 2050
- 2021 was the second worst year for fires on record, covering an area the size of Portugal
- Around 16 soccer fields of trees per minute lost to forest fires in 2021
- Roughly 70% of all fire-related tree cover loss occurred in boreal regions
- Of total area of trees consumed by fire in 2021, more than 50% in Russia



<https://fortune.com/longform/forest-fires-2019-map-world-amazon-rain-forest/>



<https://time.com/4525178/climate-change-forest-fires/>

Improper Care

- **Mulch too high**
- **Cut roots**
- **Mow too short**
- **Plant too deep**
- **Prune improperly**
- **Dead leaves removed**
- **Water competitors**
- **Fertilized**



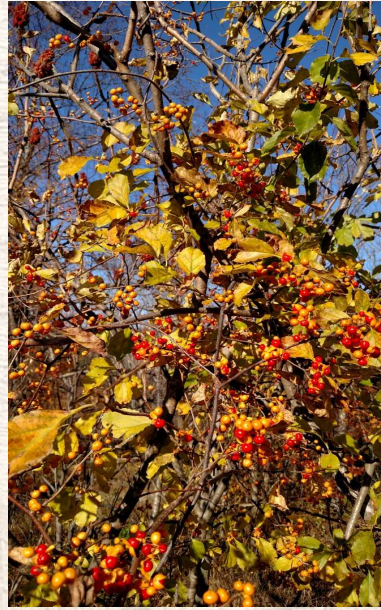
<https://mortonarb.org/plant-and-protect/tree-plant-care/plant-care-resources/mulching-trees-and-shrubs/>

Invasive Plants

Cancer of our Ecosystem

English ivy, bittersweet, kudzu

- Compete for moisture and nutrients
- Compete for sun
- Break limbs from weight
- Weaken tree so more susceptible to pests & disease
- Strangle tree
- Accelerate rot



<https://extension.unh.edu/blog/2018/04/invasive-spotlight-oriental-bittersweet>



<http://www.creativity103.com/collections/Trees/slides/ivyPC177006.html>



<https://www.treehugger.com/invasion-of-the-kudzu-monsters-4868778>

Diseases & Parasites

Susceptibility caused by stress, especially from drought & heat

- Oaks - Oak Wilt
 - Deadly fungus
 - Mostly affects red oaks
 - Out-of-Season Leaf browning
 - Vertical cracks due to under-bark fungus swelling
 - Moves by sap beetles and root transmission

- Conifers - Pine Bark Beetle
 - mass attack when tree under stress
 - Decimates full forest
 - Tree thinning helps

- Ash - Emerald Ash Borer
 - beetles lay eggs in bark larvae feed on vascular tissues (transportation system)
 - biological control – parasitic wasp

PLEASE DO NOT TRANSPORT DEAD WOOD!



Photo: Mary Alexander



Photo: Mary Alexander



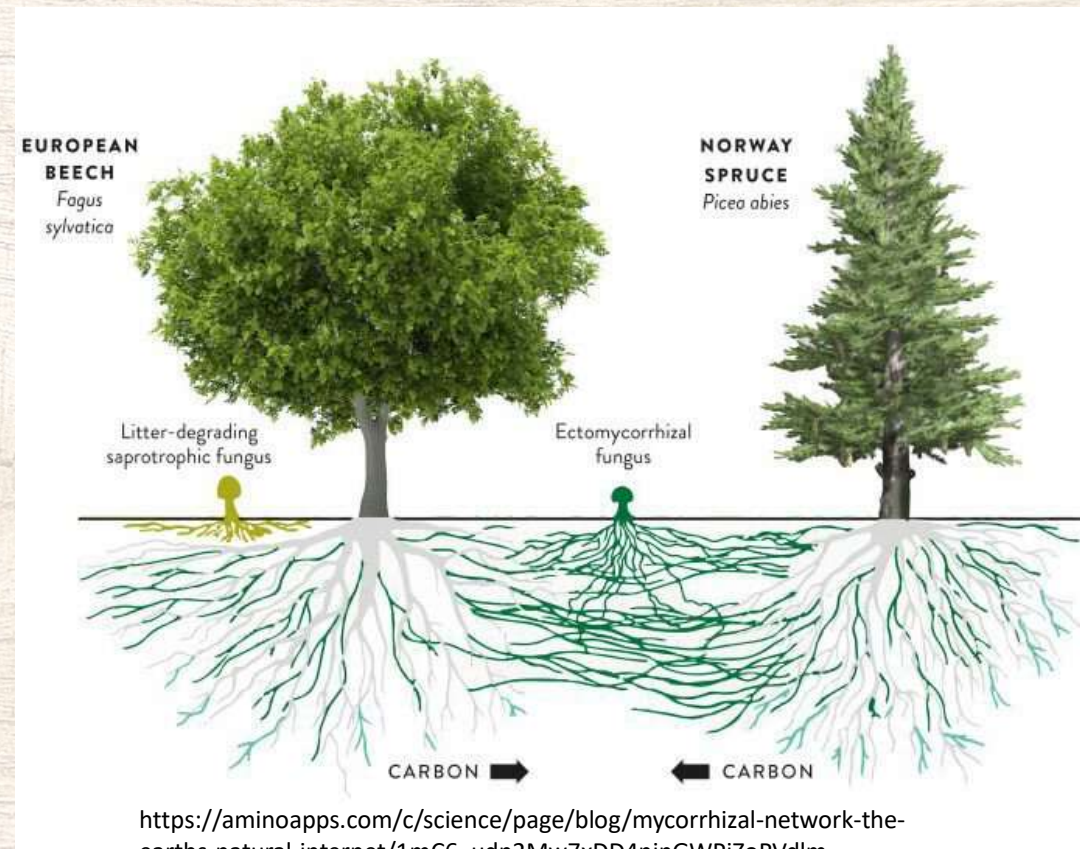
<https://news.ubc.ca/2013/03/26/mountain-pine-beetle-genome-decoded/>

How do Trees Protect Themselves?*

- Thick bark to deter predators/pathogens
- Produce chemicals to deter insect browsing
- Send signal warning to others
- Share nutrients with others via mycorrhizal fungi
 - Fungi help absorb water & nutrients
 - Tree shares sugars
- Network can connect entire forest, with old “Mother Tree” hubs
 - Mother nourishes understory seedlings
 - Retains “memory” of climate changes

Trees Need to Stay Healthy!

* See end for more on tree protection



Who Speaks for the Trees, for Trees have no Tongues – The Lorax

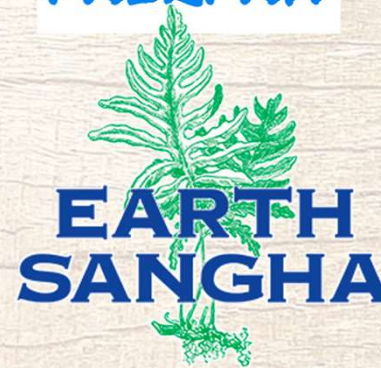
- Help reduce causes of air & water pollution
- Plant an appropriate tree (right tree/right place)
- Keep trees healthy
- Practice sustainable landscaping/create natural habitat
 - Grass sucks up water
- Don't move dead trees – spreads diseases
- Encourage politicians to be tree-friendly
- Support tree-friendly causes, i.e.,
 - Arbor Day Foundation <https://www.arborday.org/>
 - The Nature Conservancy <https://preserve.nature.org>
 - Global Forest Watch <https://www.globalforestwatch.org/>



Pinterest.com

What Else Can You Do?

- Encourage politicians to be tree-friendly
- Join/support local environmental advocacy groups, i.e., ASNV, Nature Forward, Casey Trees
- Become member of Fairfax Co. Tree Stewards, Master Naturalists & Master Gardeners
- Take a class, volunteer or nominate a conservation easement
- Support local tree-friendly causes, i.e.,
 - Casey Trees (DC area) <https://caseytrees.org/>
 - Nature Forward <https://natureforward.org/>
 - 350 Fairfax <https://350fairfax.org/>



5 Common Trees of Sky Meadows SP

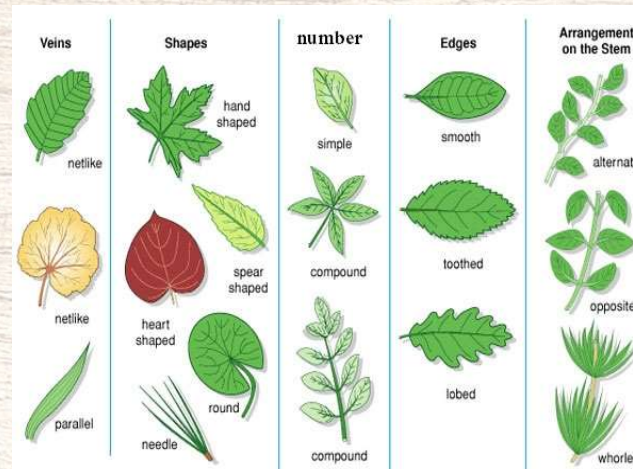


Photos: www.brighterblooms.com
www.treehugger.com
www.Delawaretrees.com
www.learnaboutnature.com

<http://gardening.ces.ncsu.edu/2015/07/8th-annual-paw-paw-festival/?src=rss>

How to ID a Tree?

- East vs West Forest & Mt vs Coastal
- Deciduous vs Evergreen
- Opposite vs Alternate Branching
- Shape (vase, pyramid, round)
- Bark (color, texture, lenticels)
- Leaves (single, shape, edges)
- Needles – 2, 3 or 5 bundle
- Flowers (season, visible, single or cluster)
- Fruit (nut, winged, berry, pod)
- Buds (American Beech pointed)



www.dreamstime.com



<https://www.gardeningknowhow.com/>



www.dreamstime.com



www.marylandbiodiversity.com

American Beech

- Thin, Gray & Smooth Bark (easily carved)
- Trunk like Elephant Legs
- Eye Spots
- Leaves remain during Winter
- Serrated (toothed) Leaves
- Long slender pointed buds
- Fruit covered in spines



www.flickr.com

Oaks

- Food for 500+ caterpillars

Northern Red Oak

- Ski Trails
- Pointed lobes on leaf
- Acorns - biyearly

White Oak

- Peeling Bark on Upper Trunk
- Rounded lobes on leaf
- Acorns - yearly



Photo: www.courageouschristianfather.com

Mockernut Hickory

- Compound leaf – 7 leaflets
- Nut with Thick Dark-Brown Husk
- Tightly networked ridged and silvery bark



Photo: www.footstepsintheforest.com

Dogwood – Virginia State Tree

- Charcoal Briquette Bark
- Opposite Leaves
- Parallel Leaf Veins
- Fall Red Berries
- Branches Grow Like Candelabra



Photo: www.edwardjohnson.com

Pawpaw

- Understory Colony Tree
- Large Leaves
- Leaves Smell Like Benzene
- Host to Zebra Swallowtail
- Fall Edible Tropical Fruit like mango/ banana/ & papaya



Photo: FandM.edu



Photo: Jayne Boyer

Thoughts

"Anyone who thinks fallen leaves are dead has never watched them dancing on a windy day." – Shira Tamir

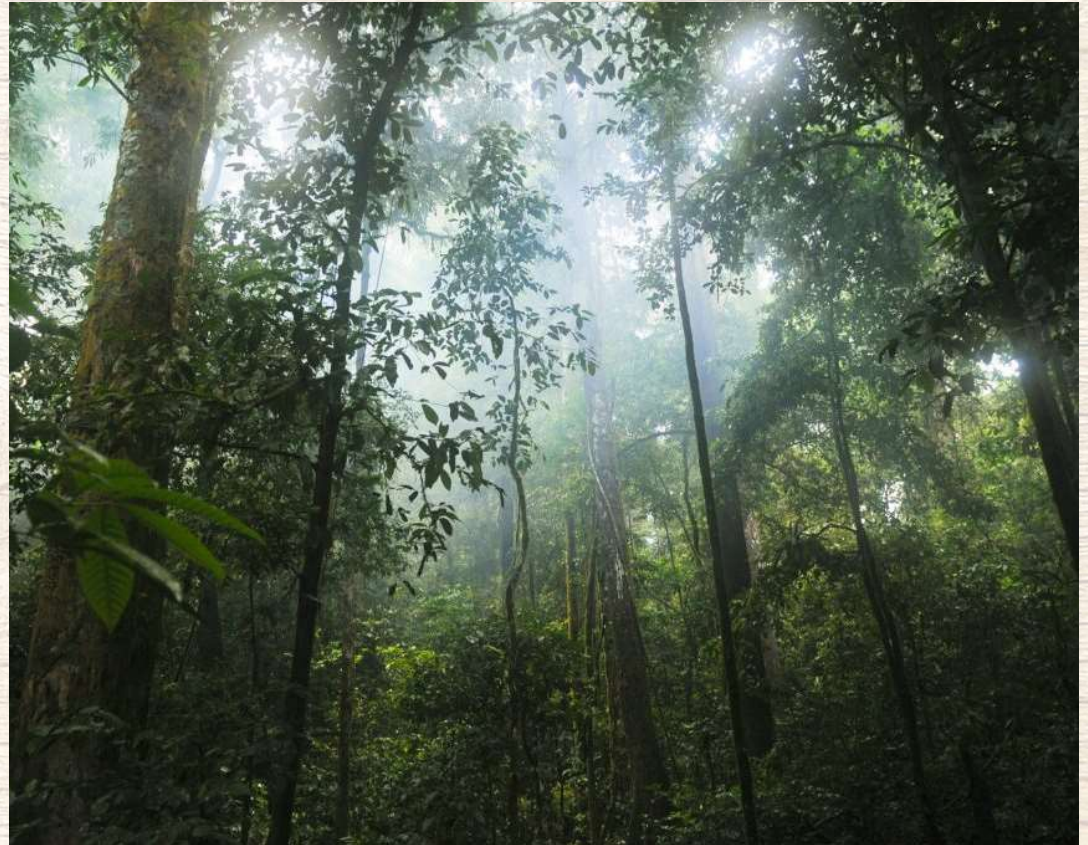
"The creation of a thousand forests is in one acorn." - Ralph Waldo Emerson

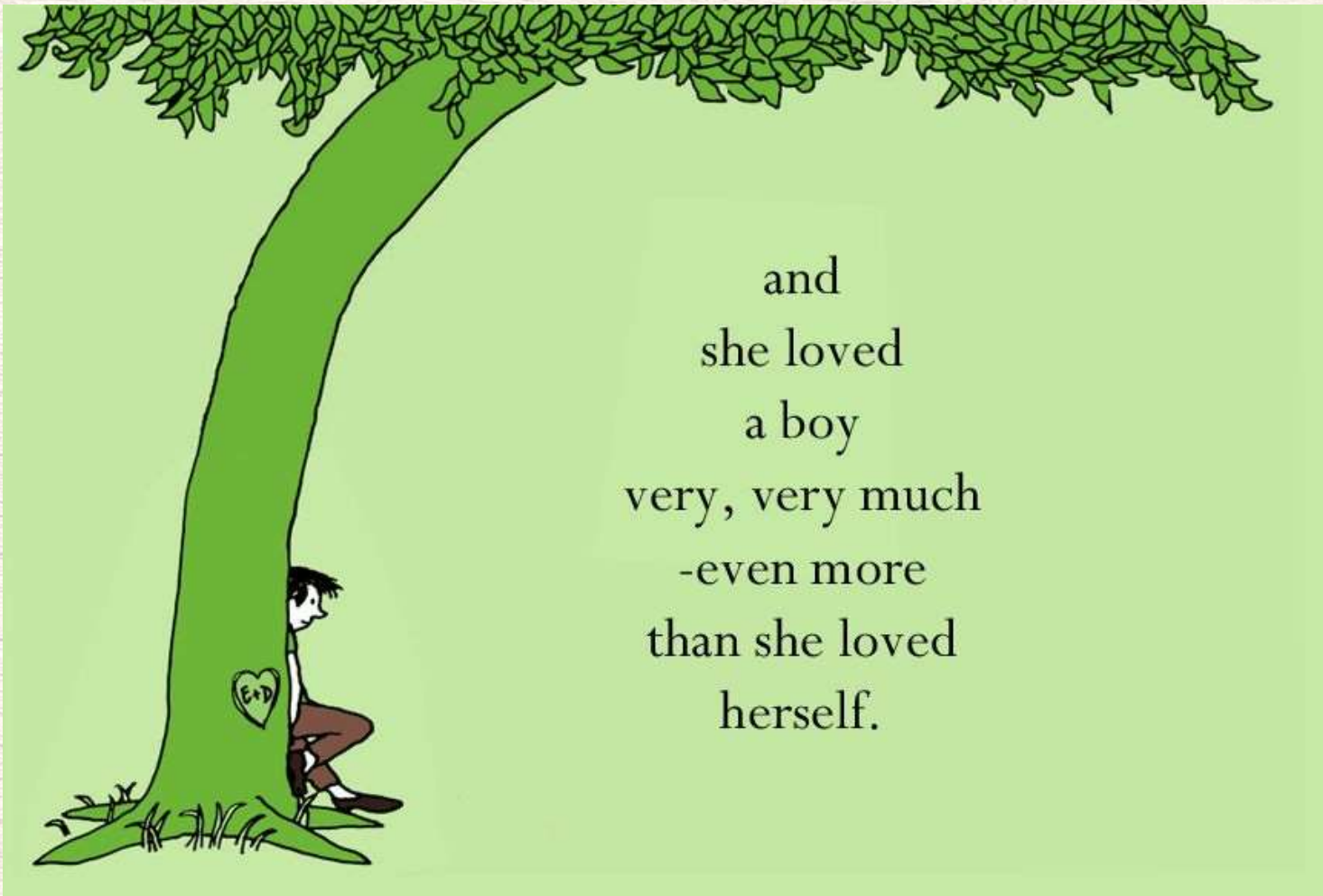
"Of all man's works of art, a cathedral is greatest. A vast and majestic tree is greater than that." - Henry Ward Beecher

"The true meaning of life is to plant trees, under whose shade you do not expect to sit." - Nelson Henderson

"Someone is sitting in the shade today because someone planted a tree a long time ago." - Warren Buffett

"Each time you read a book, a tree smiles knowing there is life after death." – Awesome Librarians





The Giving Tree by Shel Silverstein

Information and Resources

- **General**

- Finding the Mother Tree, Discovering the Wisdom of the Forest, 2021, Suzanne Simard
- National Geographic, May 2022 issue: Saving Forests: They're Key to Protecting the Planet. Now they need our help.
- The Giving Tree, 1964 Shel Silverstein
- The Hidden Life of Trees: What They Feel, How They Communicate - Discoveries from a Secret World, 2016, by P. Wohlleben
- The Illustrated Book of Trees, 2002, William Carey Grimm
- The Lorax, 1971 Dr. Seuss
- The Sibley Guide to Trees, 2009, David Allen Sibley
- Trees: A Complete Guide to Their Biology and Structure by A.R. Ennos (2016). Comstock Publishing Associates
- Trees: Their Natural History, second edition by P.Thomas (2014). Cambridge University
- Trees of the Eastern and Central US and Canada, 1957 William M. Harlow

- **Identification**

- Bark, A Field Guide to Trees of the Northeast, 2011, Michael Wojtech
- Common Native Shrubs and Woody Vines of Virginia, ID Guide, 2022, Virginia Department of Forestry
- Common Native Trees of Virginia, ID Guide, 2022, Virginia Department of Forestry
- Eastern Trees: Peterson Field Guide, 1998 George A. Petrides/Janet Wehr
- Fruit Key and Twig Key to Trees & Shrubs, 1946 William M. Harlow
- Plant Invaders of Mid-Atlantic Natural Areas Field Guide, 2022, Jil M Swearingen & Judith P. Fulton
- Tree Finder, A Manual for the Identification of Trees by Their Leaves, 1998, May Theilgaard Watts
- Winter Tree Finder for identifying deciduous trees in Winter 1970 by May Theilgaard Watts & Tom Watts
- Various Apps, including: INaturalist

More on Tree Defenses

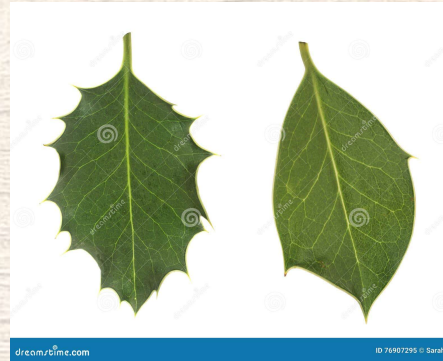
- Overall vitality is important
- Can sense touch (browsing)
 - Sends “alarm” (chemicals, scents or roots) to others
 - Can signal what type pest is browsing
 - Receives “help” (nutrients) from others
- changes leaves to spiky or poisonous (yew)
- Use chemicals to deter predators - Chemical wall around invasion
- Use scents to attract pollinators or predator insects
 - Acacia tree (Africa) sends gas signal when browsed by giraffes
 - Other Acacias pump distasteful tannins into leaves
- Build physical wall around pest (galls)
- Thorns & hairs - locust, European holly - use chemicals to change smooth leaves to spiky after browsing
- Close leaf - mimosa
- Bark (thick “skin”) protects against pathogens & browsing
 - Ponderosa Pine extra thick bark & drops lower branches
- Serotinous cones – fire heat melts gluey resin to release seeds – lodgepole pine



www.onetreeplanted.com



www.mountainviewtree.com



Dreamscape.com



Ecofarmingdaily.com