

Trees & Shrubs For Low Water Use Gardens

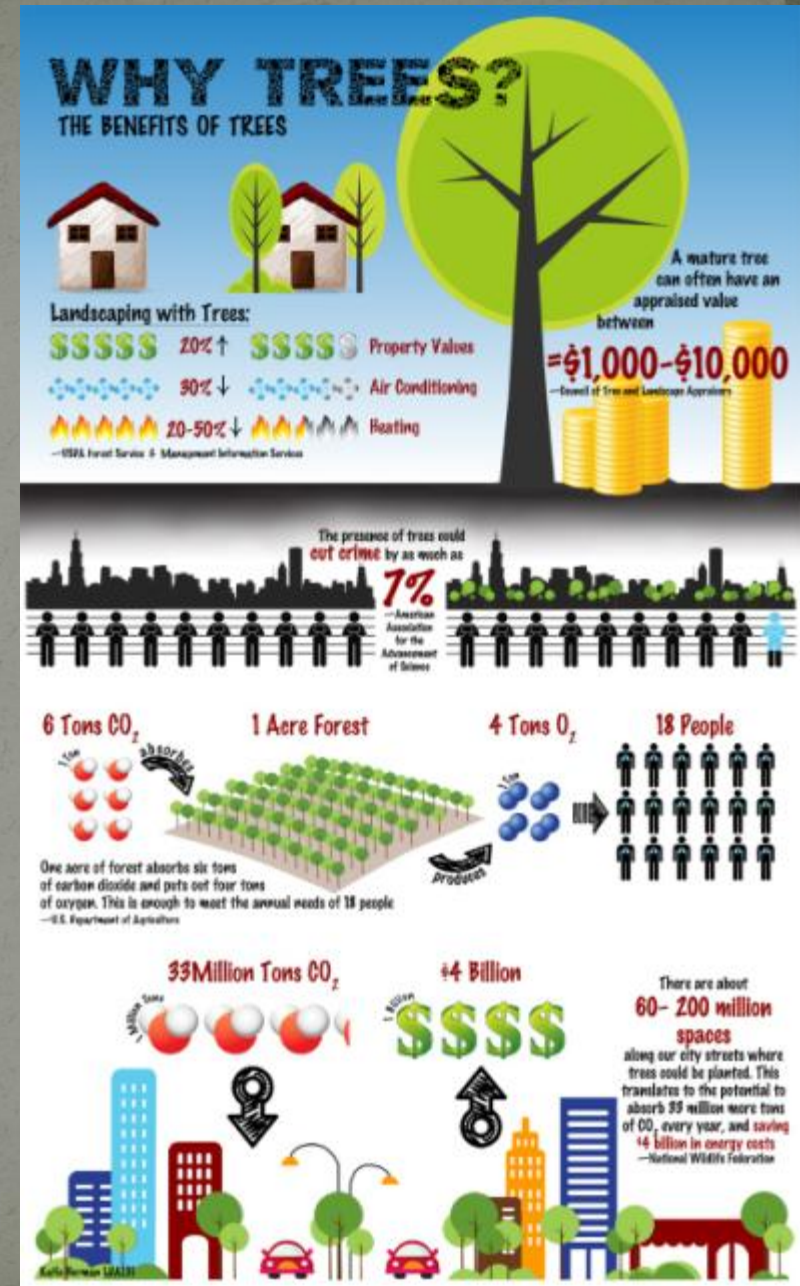
Paula Dinius, Urban Horticulturist
WSU Chelan County Extension

Why Plant Trees & Shrubs?



Green Infrastructure

- Urban Tree Benefits
 - Local climate and energy use
 - Air quality
 - Climate change
 - Water flow and quality
 - Noise abatement
 - Wildlife and biodiversity
 - Soil quality
 - Real estate and business values
 - Individual well-being and public health
 - Community well-being



Green Infrastructure - healthy urban forest



Washington Drought 2015

DROUGHT INFORMATION

Drought Laws and Rules
Water Supply
Water Conservation

CONTACTS

Questions and concerns
about water supplies in
your area?

General Questions:

Jeff Marti,
drought coordinator,
360-407-6627

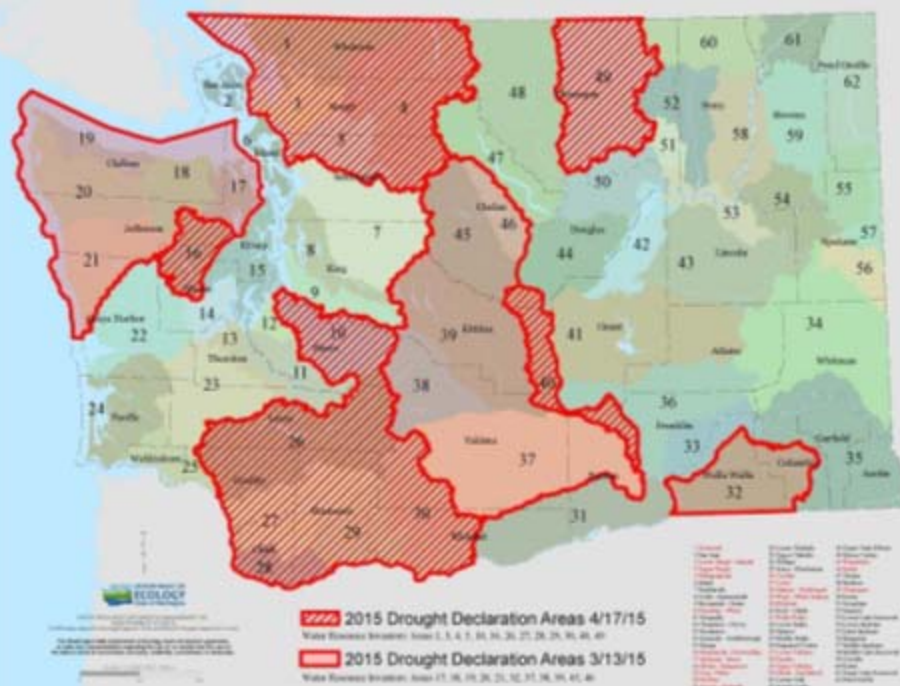
Dan Partridge,
communications manager,
360-407-7139

Regional Contacts:

Yakima, WRP Help Desk,
509-575-2597

Walla Walla, Eric Hartwig,
509-329-3427

Olympic Peninsula, Mike
Gallagher,
360-407-6058



Updated: April 21, 2015

Governor Inslee declares more areas in drought- Ecology in drought response for almost half of Washington

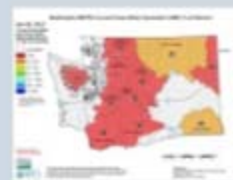
NEW! April 21, 2015 The Bureau of Reclamation is releasing a mid-April 2015 Total Water Supply Available forecast for the Yakima Basin because of the decline in reservoir storage and low stream flows. The TWSA indicates a full water supply for senior water rights during the 2015 irrigation season, but an **estimated 54 percent supply for junior water rights**. Reclamation will issue water supply forecasts monthly or as needed at least through July.

• [View BOR news release](#)

On April 17, 2015 Governor Jay Inslee declared a drought in [13 river basins](#) in Washington state.

• **NEW!** Governor adds 13 more river basins to list of areas qualifying for drought relief funds - Basin details April 17, 2015

SPOTLIGHT



DROUGHT UPDATES

Subscribe to the
[E-mail ListServ](#)
[Blog - ECOconnect](#)
[Twitter #WAdrought](#)

RESOURCES

[Water Conservation](#): It all starts with you

[Frequently Asked Questions on Drought Preparations](#)

[Water Supply Availability Committee \(WSAC\)](#) - April 7, 2015 Meeting agenda and materials

[Washington Water Supply Information](#) - data portal

[Drought Insurance Program \(DIP\)](#) "The legislature tasked OCR with reducing drought risk for interruptible water users"

ARCHIVE

• [2010 Drought Archive](#)

LEGISLATIVE REPORTS

• [2005 Drought Response](#)
• [2001 Drought Response](#)

Source:
<http://www.ecy.wa.gov/drought/index.html>

Need for Careful Selection

- Long term investment
- Establishment is at least 2 growing seasons
- Harsh summer and winter condition
- Soils naturally low in organic matter
- Low precipitation and drying wind

Thriving



Surviving



Site Considerations

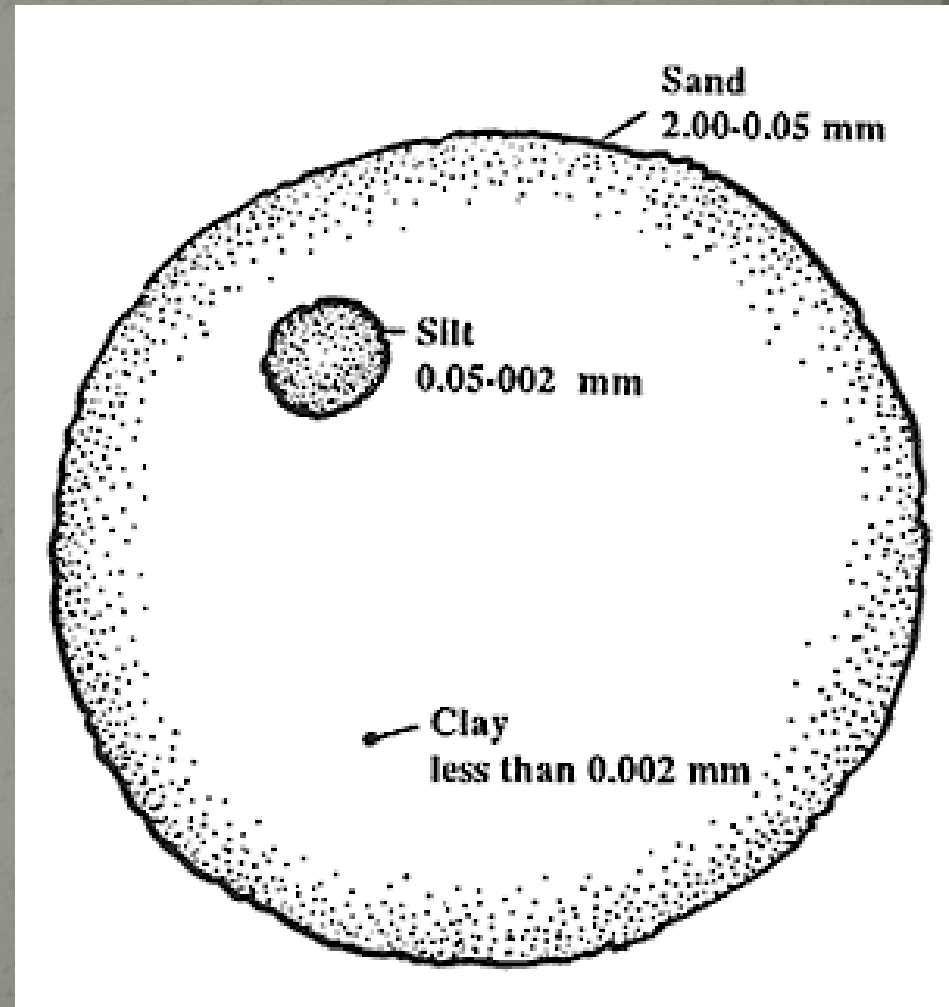
Soil water & nutrient holding capacity

Available soil volume

Slope & exposure

Soil Texture

- Texture –
 - mineral particles of various size
 - The amount of
 - Sand
 - Silt
 - Clay
- Loam – mixture of particle sizes



Soil Particle Settling Test & Triangle

SAND



LOAM



CLAY



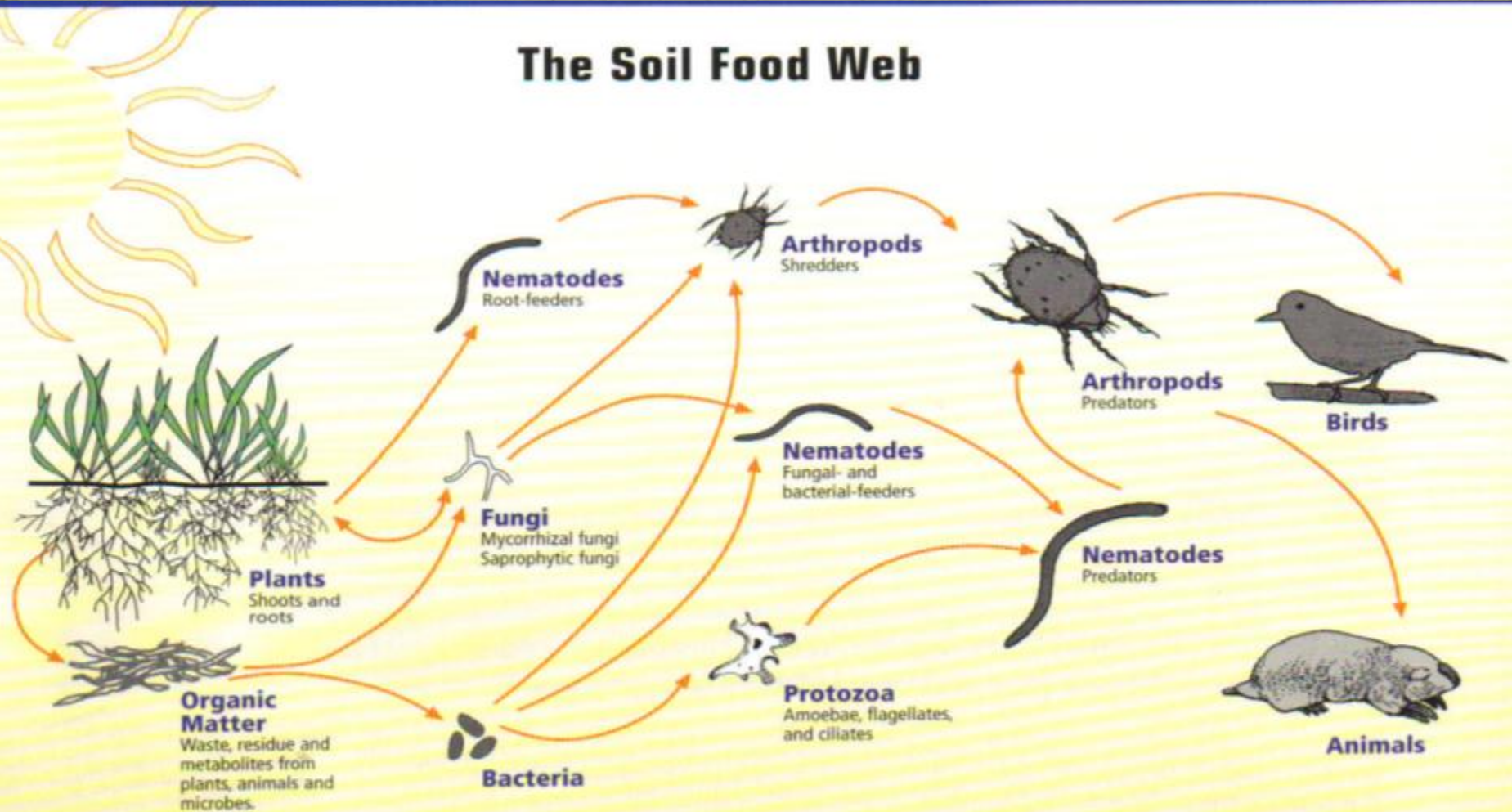
0 - 10% clay
0 - 10% silt
80 - 100% sand

10 - 30% clay
30 - 50% silt
25 - 50% sand

50 - 100% clay
0 - 45% silt
0 - 45% sand

Biological – Organic Matter

The Soil Food Web



First trophic level:
Photosynthesizers

Second trophic level:
Decomposers Mutualists
Pathogens, Parasites
Root-feeders

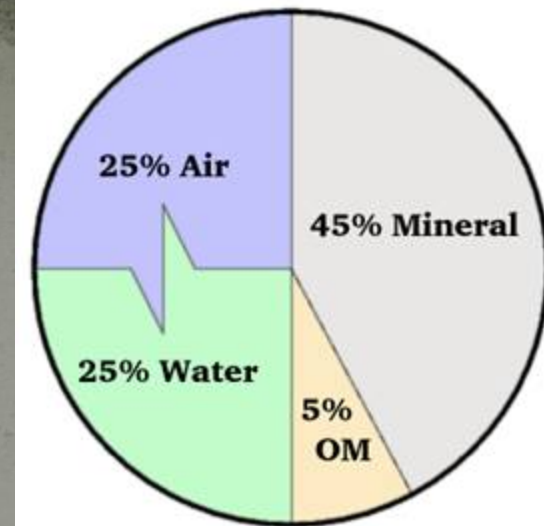
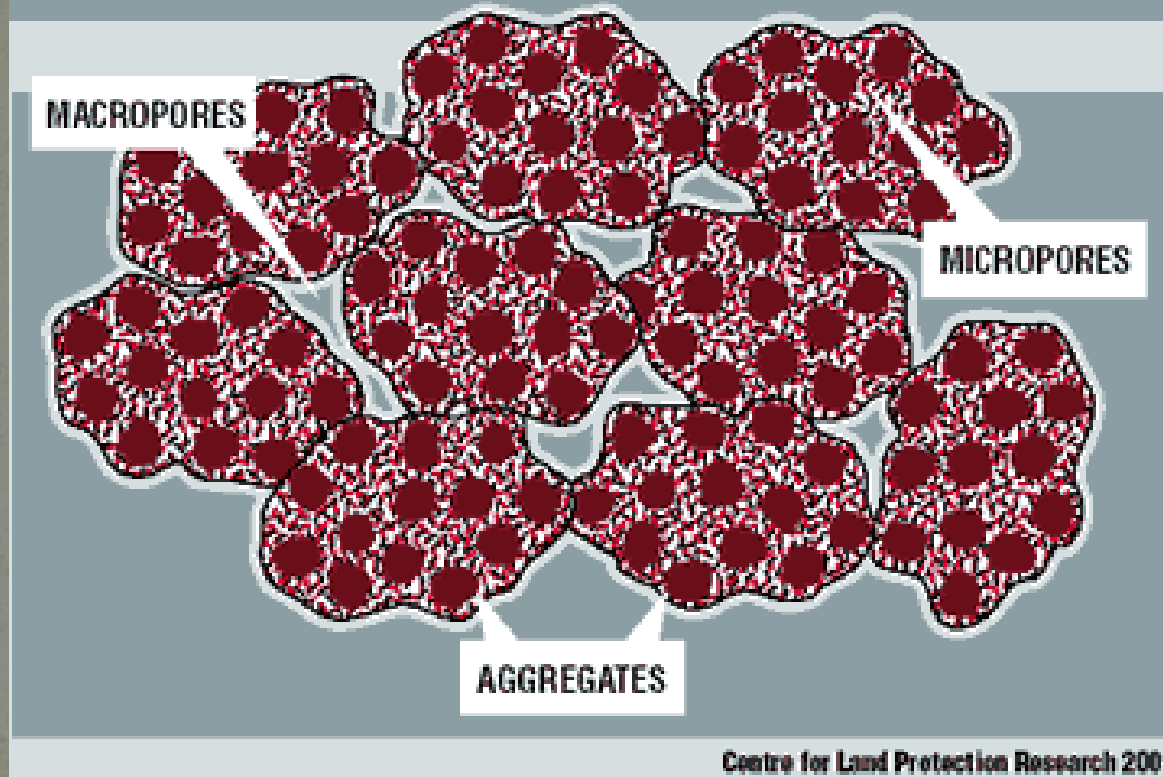
Third trophic level:
Shredders
Predators
Grazers

Fourth trophic level:
Higher level predators

Fifth and higher trophic levels:
Higher level predators

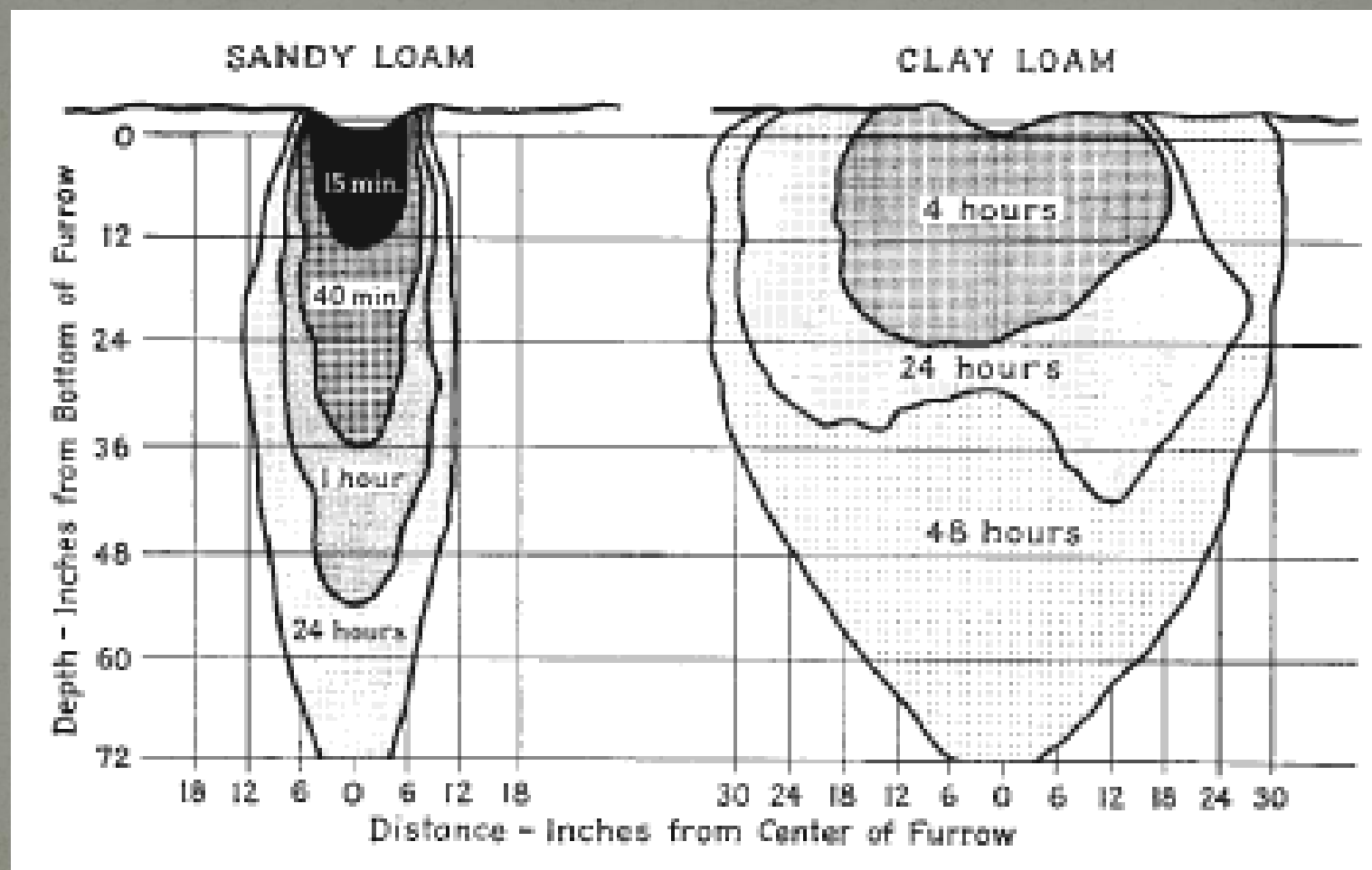
Soil Structure

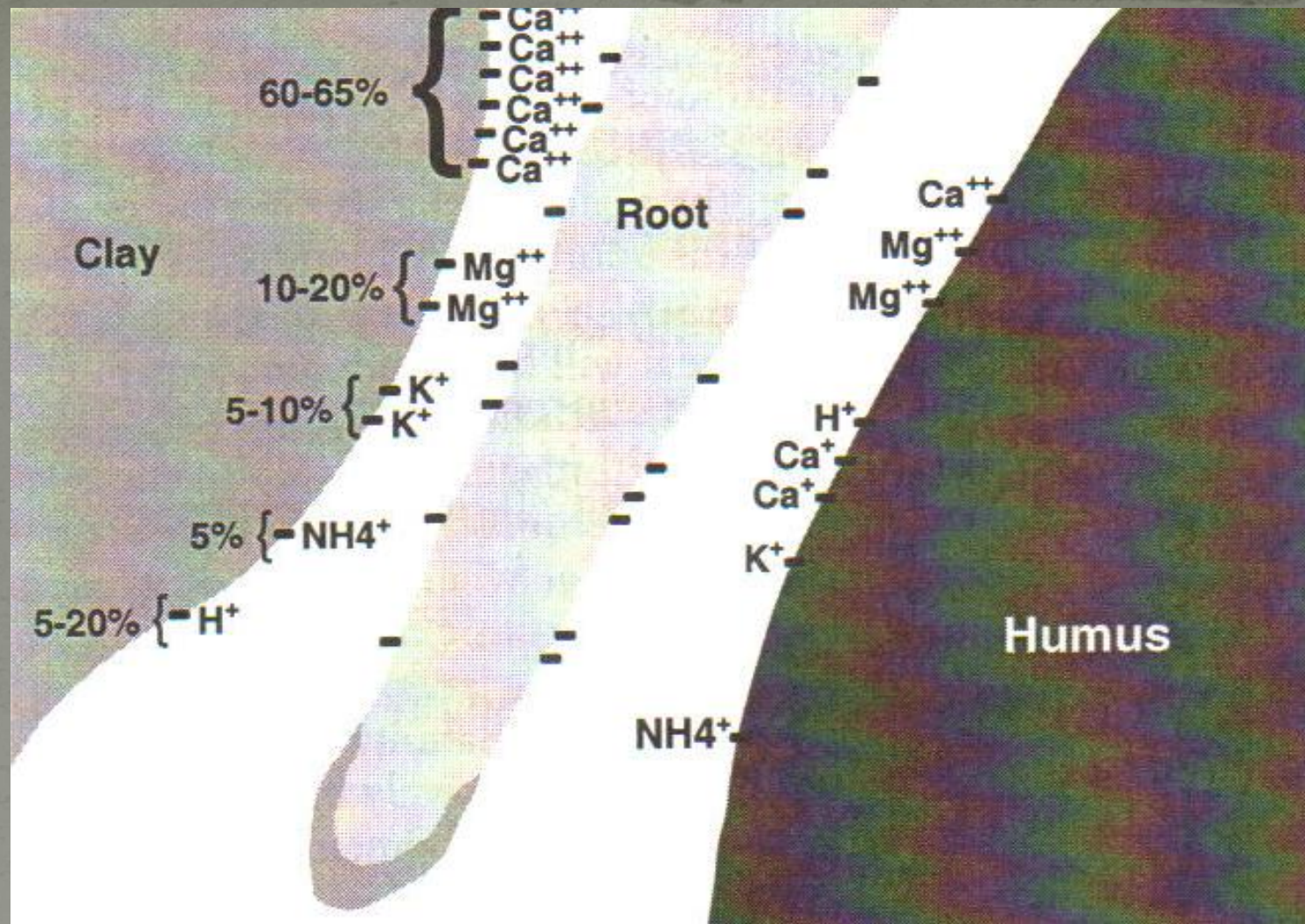
SOIL STRUCTURE COMPONENTS



Water coats the solid particles and fills the smaller pore spaces. Air fills the larger pore spaces.

Soil Wetting Patterns





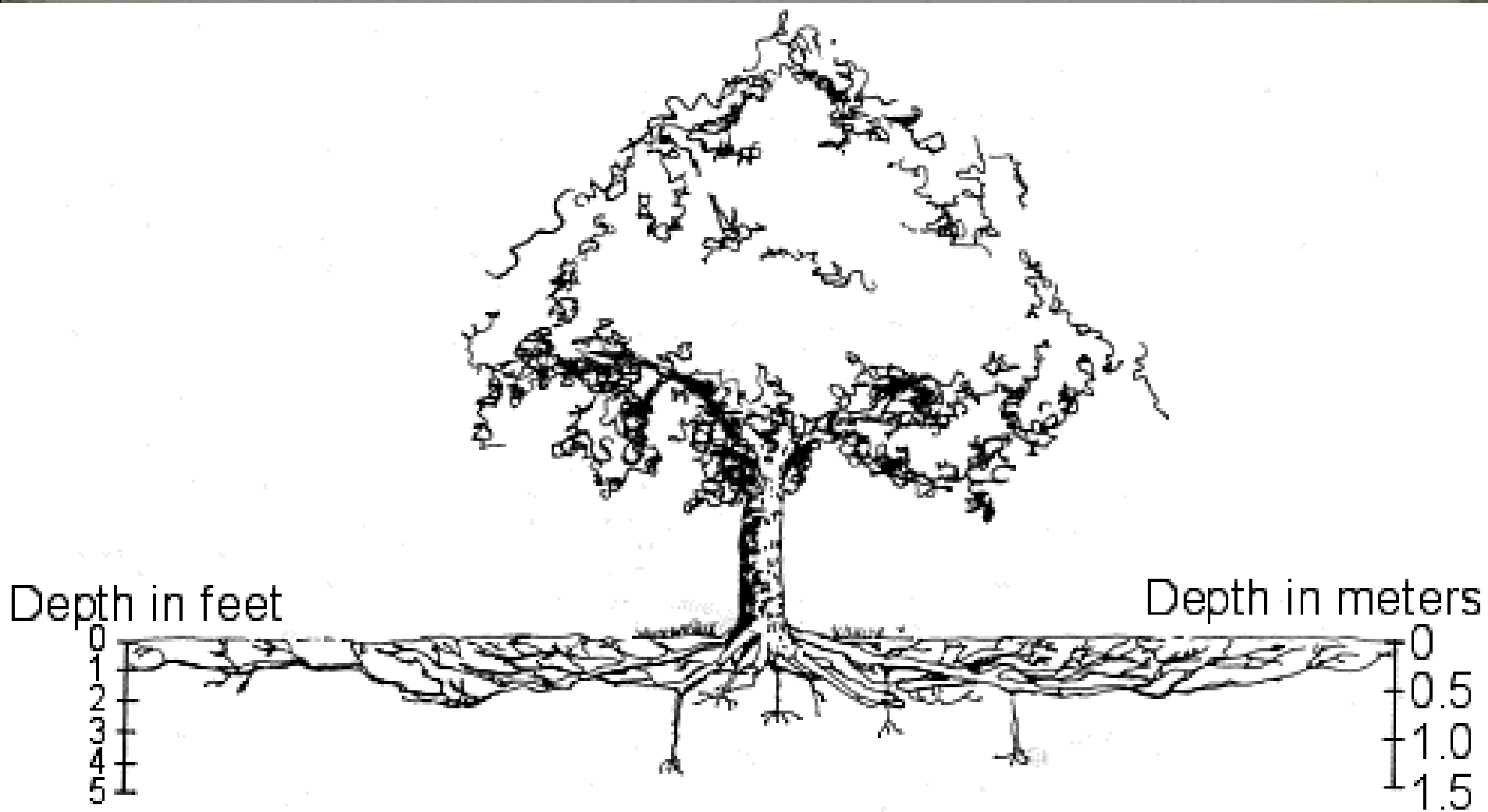
- Cation Exchange Capacity (CEC) is the ability of a soil to provide a nutrient reserve for plant uptake.

Soil Volume and Resource Competition

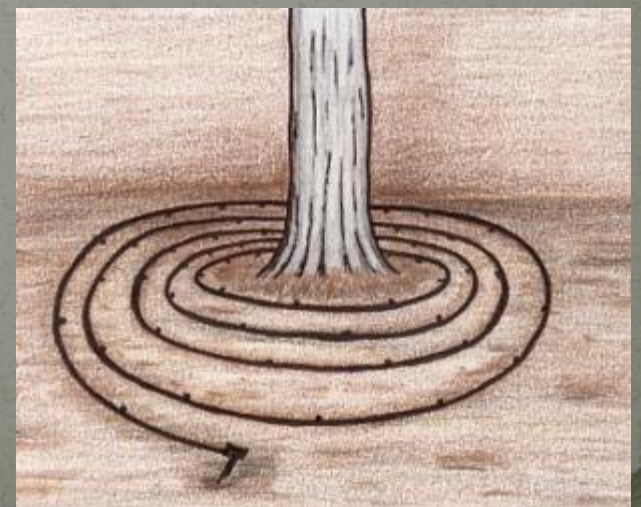
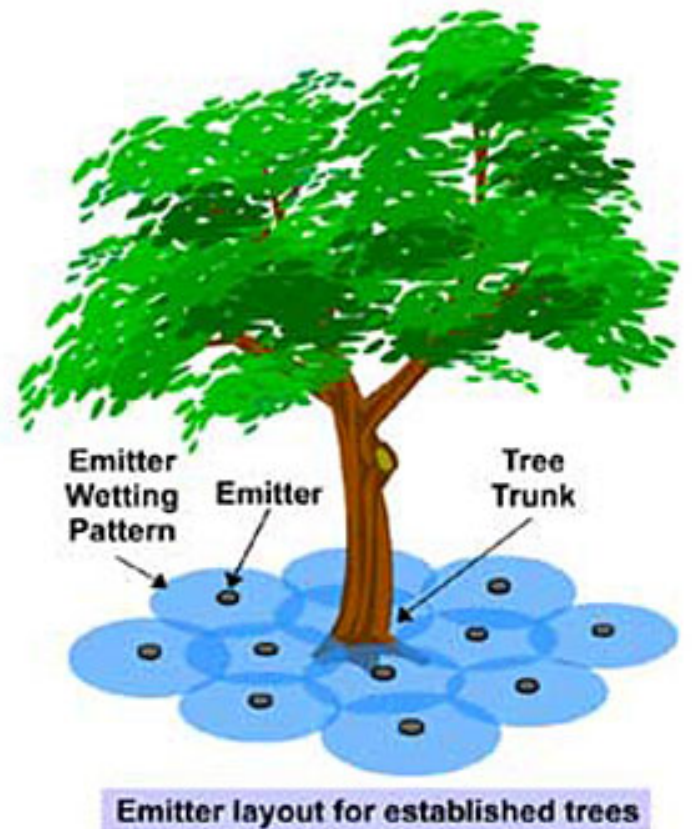


In arid regions most competition for resources is underground – water and nutrients

Tree Roots



Drip Irrigation



Slope and Exposure



Microclimates Matter



Mulch – Mulch - Mulch

- Reduces soil water evaporation
- Adds soil nutrients
- Regulates soil temperature



Woody Plant Drought Adaptations

Slower growth/smaller

Grow further apart

Deeper root/more extensive root system

Foliage adaptations

Woody Plant Drought Adaptations

- What we know ~
 - Water needs vary by plant species, size, air temp, humidity, light, & wind.
 - Water loss from leaves is controlled by stomatal opening and closing in response to the environment.
 - Woody plants respond to water deficit by dropping leaves & growing more roots.



Woody Plant Drought Symptoms

- Prolonged high heat load
 - Water stress
- Evapotranspiration deficit
 - Leaf scorch, twig dieback



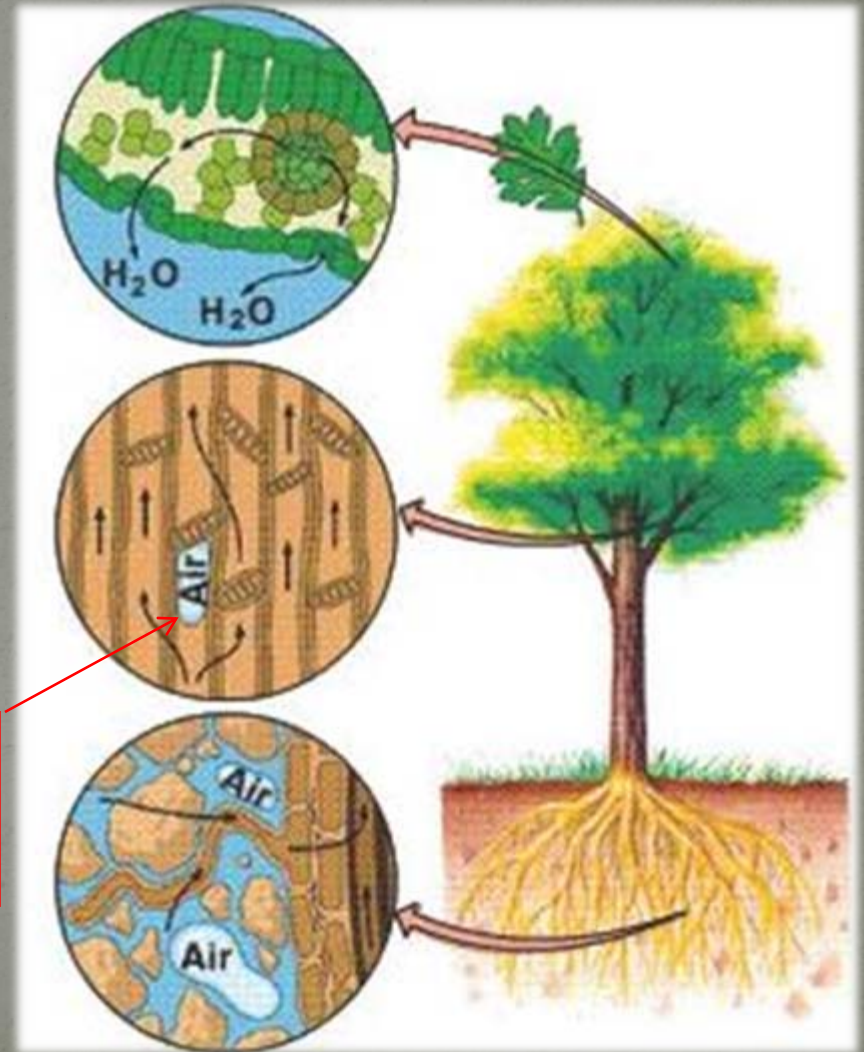
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Woody Plant Drought Symptoms

- Evapotranspiration deficit

In hot, sunny areas roots are unable to supply water to the foliage as rapidly as it is lost by transpiration from the leaves.

Air bubbles can form blocking xylem vessels - called cavitations.



Woody Plant Drought Symptoms



Woody Plant Drought Symptoms

- Sun and heat adaptations
 - Sunken stomata
 - Waxy cuticle
 - Hairs
 - Reduced surface leaf surface area
 - Mimosa tree
 - *Albizia julibrissin*



© Stephen M. Selberling, University of North Carolina Herbarium

Drought Tolerant Trees & Shrubs

Presidential Gold[®] Ginkgo

Ginkgo biloba 'The President'

- Size: 50' x 40'
- Foliage: Medium green
- Fall Color: Bright yellow
- Fruit: Seedless
- Comments: Strong central leader and a dense upright crown.

pH 8.2
Moisture 12



Eastern Red Cedar

Juniperus virginiana cultivars

- Size: 40' x 20' to 12' x 2'
- Cultivars:
 - 'Brodie' 30' x 15', Foliage dark green
 - 'Blue Arrow' 10' x 2', Foliage blue/green
- Foliage: Needles – scales & awls
- Cones: Small berry-like

pH 8.2
Moisture 12





Summerburst® Goldenrain Tree

Koelreuteria paniculata 'JFS-Sunleaf'

- Size: 30' x 30'
- Foliage: Pinnately compound, glossy dark green
- Fall Color: Yellow/orange
- Flower: Bright yellow, in large clusters

pH 8.2
Moisture 12

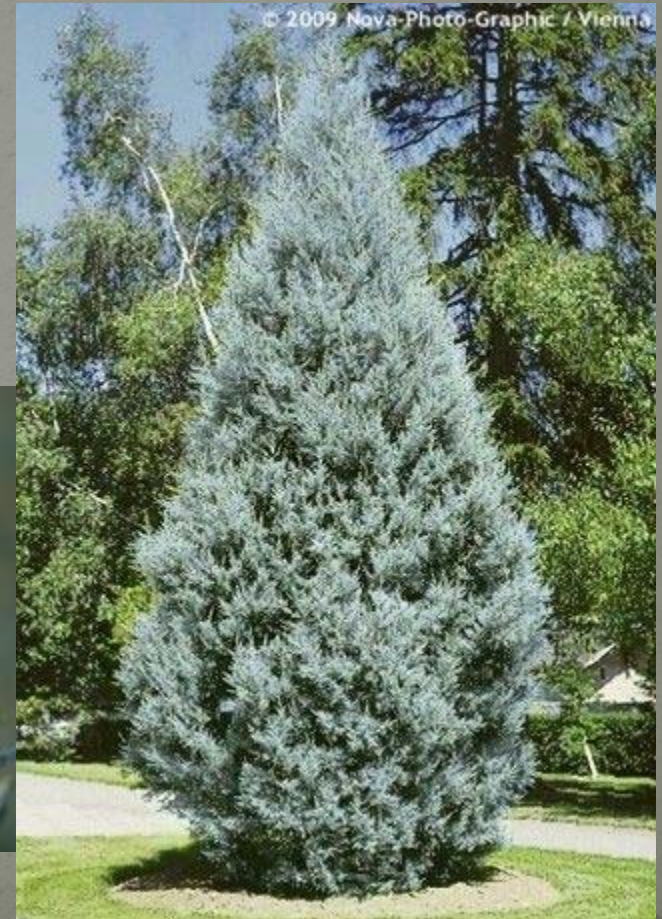


Blue Ice Arizona Cypress

Cupressus arizonica var. *glauca* 'Blue Ice'

- Size: 20' x 10'
- Foliage: Blue/green scale type needles
- Cone: Small, berry-like
- Comments: Very heat and drought tolerant; zone 6b

pH 8.2
Moisture 12



Eye Stopper[™] Cork Tree

Phellodendron amurense 'Longenecker'

- Size 40' x 35'
- Foliage: Medium green
- Fall Color: Bright yellow
- Fruit: Generally seedless
- Comments: This cultivar has the clearest, bright yellow foliage

pH 8.2
Moisture 11



Limber Pine

Pinus flexilis 'Vanderwolf's Pyramid'

- Size: 25' x 15'
- Foliage: Blue/green needles, 3 ½" in bundles of 5
- Cone: To 8 inches
- Comments: Heat, wind and drought tolerance

pH 8.2
Moisture 11



Frontier Elm

Ulmus 'Frontier'

- Size: 40' x 30'
- Foliage: Glossy green
- Fall Color: Burgundy
- Comment: Good disease tolerance; hybrid of *U. carpinifolia* and *U. parvifolia*

pH 8.2
Moisture 11



New!

Mint Truffle Bosnian Pine

Pinus leucodermis 'Mint Truffle'

- Size: Intermediate, slow growing – to 30'
- Foliage: Needles, glossy densely arranged in bundles of 2
- Cone: 2 inch
- Comment: Tolerant of a variety of conditions

pH 8.2
Moisture 11



Japanese tree lilac

Syringa reticulata, 'Ivory Silk'

- Size: 25' x 20'
- Foliage : Dark green
- Flowers: Creamy white panicles in summer
- Fall color: Insignificant

pH 8.2
Moisture 11



Sterling Linden

Tilia tomentosa 'Sterling'

- Size: 40' x 35'
- Foliage: Green with silver-gray undersurface
- Fall Color: Yellow
- Flower: Creamy white, fragrant

pH 8.2
Moisture 10





Afterburner[®] Tupelo

Nyssa sylvatica 'David Odom'

- Size: 35' x 20'
- Foliage: Bright green glossy
- Fall Color: Bright red
- Fruit: Small blue/black 'berry'
- Comments: Straight central leader, good structure

pH 7.5
Moisture 10



Ruby Vase® Parrotia or (Vanessa)

Parrotia persica 'Inge's Ruby Vase' or ('Vanessa')

- Size: 28' x 16'
- Foliage: Dark green; red new growth
- Fall Color: Orange red
- Flower: Showy red stamens

pH 8.2
Moisture 10



American Ash

Fraxinus americana 'Autumn Purple'

- Size: 40' x 40'
- Foliage: Green, heavily textured
- Fall color: Reddish purple
- Comments: Seedless

pH 8.2
Moisture 10



Yellowwood

Cladrastis kentukea

- Size: 30' x 35'
- Foliage: Bright green
- Flower: White, long clusters in spring
- Fall color: Brilliant yellow

pH 8.2
Moisture 10



Ebbingei Silverberry

Elaeagnus x ebbingei 'Gilt Edge'

- Size: 4' x 4'
- Foliage: Dark glossy green with yellow margins
- Flower: Silvery, tiny but fragrant
- Fruit: red fall fruit
- Comments: Evergreen, tolerant of heat and wind

pH 8.2
Moisture 12



Oregon Grape

Mahonia eurybracteata 'Soft Caress'

- Size: 3' x 3'
- Foliage: Dark glossy green, finely cut
- Flower: Yellow in spring & fall
- Comments: Drought and dry shade tolerant
- Zone: 7

pH 7.5
Moisture 11



Ninebark

Physocarpus opulifolius 'CV'

- Size: 5' to 12' tall and wide, depending on cultivar
- Foliage: Depending on cultivar - burgundy, dark purple, gold, or dark green
- Flowers: White to light pink, clusters in spring to summer

pH 8.2

Moisture 11



Blue Mist Spirea

Caryopteris clandonensis 'Heavenly Blue'

- Size: 2' x 3'
- Foliage: green/gray fragrant
- Flower: Blue in summer, fragrant
- Comments: Nice in groupings

pH 8.2
Moisture 11



Tiger Eye[®] Sumac

Rhus typhina 'Bailtiger'

- Size: 6' x 6'
- Foliage: Lime green, pinnately compound
- Flower: Terminal cone shaped panicle
- Fall color: yellow/orange/red

pH 8.2
Moisture 11

Weigela sp.



Heavenly Bamboo

Nandina domestica 'Gulf Stream'

- Size: 4' x 5'
- Foliage: New growth bronze orange tipped, turning green
- Fall color: Red orange
- Comments: Zone 6

pH 8.2
Moisture 11



New!

Snow Day[®] Pearl Bush

Exochorda 'Blizzard'

- Size: 5' x 5'
- Foliage: Medium green
- Flowers: White, late spring – early summer
- Comments: Nice hedge plant

pH 7.5 (8.2?)
Moisture 11



Carolina Allspice

Calycanthus florida

- Size: 6' x 6'
- Foliage: Deep green leathery
- Flower: Maroon 2" magnolia-like in late spring, fragrant
- Comments: Part shade tolerant

pH 8.2
Moisture 10



Additional Reading

- Low Water Use Landscaping. UC Davis.
 - <http://ccuh.ucdavis.edu/public/ysb-series/past-events-folder/ysb-low-water-use-landscaping/uc-davis-11-8-2014/uc%20davis>
- EPA Water Sense program
 - http://www.epa.gov/watersense/outdoor/landscaping_tips.html
- CalPoly San Luis Obispo, Urban Forest Ecosystem Institute
 - http://selectree.calpoly.edu/attribute_search.lasso
- Utah State University Extension
 - <http://treebrowser.org/>
- USDA Plant Database
 - <http://plants.usda.gov/java/>
- Silvics of North America
 - http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm

Questions ?

Contact Information

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