Tree Workshop Winnett, MT
March 27, 2025

by Patrick Plantenberg
Chair, MT Urban &
Community Forestry Assn.

TREE SELECTION
TREE PLANTING
TREE PRUNING
SHELTERBELTS & WINDBREAKS

Tree Selection

Select a tree that is hardy for your area

-Do your homework!

-Never leave the nursery without checking if the plant your just purchased will work for your site: hardiness, size, etc.

Tree Selection

Select a tree that is hardy for your area

-Most of eastern Montana is listed as USDA Hardiness Zones 2-4. Zone 2 is the coldest.

-Even hardy plants suffer in Montana's extreme weather fluctuations especially in winter with little snow cover, long cold snaps, or persistent wind conditions in cold dry spells.

Tree Selection

Selecting a tree that is hardy for your area

-Once a tree gets established it has a better chance of survival than a newly planted tree.

-Trees planted in urban settings can survive better than trees in the open because of the moderating effects of other trees and structures nearby.

Tree Selection

Selecting a tree that is hardy for your area

-Don’t expect the local hardware store garden center or box stores like Home Depot or Lowes to have the best trees for your area.

-Ensure the tree selected is hardy for your area by searching several reputable sites on the internet before you buy.

Trees Observed in Winnett

Native Cottonwoods

Narrowleaf, Sargent/Plains

Populus species

- Large Shade Trees-not for Residential Areas (>60’ tall)
- Sargent/Plains Cottonwood is less Likely to Spread by Underground Shoots
- Buy Male Trees to Avoid “Cotton” from Female Seeds
- Hardy Zone 3

Trees Observed in Winnett

Introduced Cottonwood species

- White cottonwood (*Populus alba*)

-Large trees (70+ feet)

-Male and female plants

-Not recommended for residential yards

-Tolerates a wide range of soils.

-Sends up shoots everywhere!

Trees Observed in Winnett

Hot Wings Tatar maple (*Acer tataricum*)

-introduced small maple tree tolerant of alkaline soils, Zone 3

-15-25’ tall (can plant near power lines)

-drought tolerant

-tolerates clay soil

-red samaras in summer

-can produce a lot of seedlings

Trees Observed in Winnett

Rocky Mountain juniper cultivars
(*Juniperus scopulorum*)

-native species, deer resistant, male and female plants, drought tolerant,
-tolerates shallow, rocky soil, Zone 3
-Cultivars ‘Wichita Blue’ 20’T x 15’W & ‘Medora’ 20’ Tx 6’W
-can plant under powerlines
-alkaline tolerant

Trees Observed in Winnett

Thornless Honeylocust (*Gleditsia triacanthos var. inermis*) Zone 3

-graceful large tree >40’ tall

-buy male plants to avoid seed pods

-deer resistant; drought, clay soil, & wind tolerant

-’Northern Acclaim’, other cultivars

-tolerates high summer heat, and saline conditions.

Trees Observed in Winnett

Crabapple varieties (*Malus* spp.) identified:

Spring Snow Crabapple: Zone 4,

-fair fireblight resistance,

->25’T x 20’W

-white flowers,

-green leaves,

-no fruit!

-adapted to wide range of soils

Trees Observed in Winnett

Other potential crabapples:

-Pick those with excellent fireblight resistance!

-All produce messy crabapples

Thunderchild Crab

Gladiator-Zone 2-4, excellent fireblight resistance, 20’T x 10’ W, pink flowers, purple leaves, ½” fruits

Radiant-Zone 3, excellent fireblight resistance, 25’T x 20’ W, pink flowers, green leaves ½” fruit

Several others…….don’t plant along sidewalks

Trees Observed in Winnett

Colorado blue spruce (*Picea pungens*)

-Zone 2, 60’ T x 30’ W

-large evergreen tree too large for residential yards

-rabbit and deer browsing tolerant

-wide spreading shallow roots make it susceptible to windfall

-not tolerant of saline soils

-smaller columnar cultivars available

Trees Observed in Winnett

Linden species (*Tilia americana)*

-cultivars ‘Redmond’, ‘American Sentry”

-pyramidal shape

Zone 2-4, >40’T x 30’W

-tolerates drought and clay soil

Other Linden Species to Try

Littleleaf Linden *(Tilia cordata)*

-Cultivars: ‘Greenspire’ Zone 3;
‘Morden’ Zone 2b

-pyramidal shape
>30T x 20’W

-tolerates some drought

-doesn’t like saline soil

Other Linden Species to Try

Dropmore Linden *(Tilia x flavescens)*

-pyramidal shape

Zone 3a, 35’T x 25’W

Harvest Gold Linden

-*Tilia cordata* x *mongolica*

Zone 3, 35T x 25’W

Trees Observed in Winnett

Green ash (*Fraxinus pennsylvanica*)

-native to eastern Montana woody draws

-not recommended to plant anymore because of Emerald Ash Borer; male plants

-most common street tree in MT

-don’t plant other ashes

-’Autumn Purple’

white ash, ‘Mancana’,

Mountain Ash

Trees Observed in Winnett

Russian olive (*Elaeagnus angustifolium*)

-invasive Category 3 noxious weed in Montana

-drought and salt tolerant

-nasty thorns;

Herbicides: triclopyr (Remedy, Garlon 3A, Garlon 4), 2,4-D & triclopyr (Crossbow), imazapyr (Arsenal, Habitat), or glyphosate(Roundup). Consult the label onto add nonionic surfactants.

Trees Observed in Winnett

Canada Red Chokecherry (*Prunus virginiana*)

-purple leaves, not as prolific a berry producer as common chokecherry; Zone 2;

-small to medium tree, 25-30’T x 15-20’W

-suckers badly because it wants to be a shrub,

-hard to prune

Trees Observed in Winnett

Common chokecherry (*Prunus virginiana*)

-native berry producing shrub

-spreads to form thickets

Tolerant of alkaline soil,

clay soil, dry sites

-up to 15 feet tall

Trees Observed in Winnett

Aspen (*Populus tremuloides*)

-native colony forming tree in foothills of the mountains; sends up shoots in yard

-not recommended for Winnett

-most plants purchased at nurseries are from areas west of the divide and grow like cottonwoods and die in our extreme winter conditions

-host to many diseases

Trees Observed in Winnett

Bur oak (*Quercus macrocarpa*)
-native oak in eastern Montana on bentonitic clay soils
-tolerant of drought, clay soil, and dry alkaline soils
-slow growing, has acorns
-Zone 3, >40’T x >40’ W
-susceptible to bullet gall
-don’t plant near sidewalks

Trees Observed in Winnett

Siberian elm (Ulmus pumila)
-not recommended for Winnett
-planted in old shelterbelts
adapts to both wet and dry sites
-tolerant of poor soils.
-freely self-seeds,
-can be a nuisance
-Zone 3-4, >50’Tx 40’W
-loses branches in wind

Trees Observed in Petroleum County

American Elm (*Ulmus americana*)

-native to woody draws in eastern MT

-plant DED resistant cultivars

adapts to both wet and dry sites

-tolerant of poor soils; Zone 3-4,

->60’Tx 40’W; tolerant of urban conditions

-Cultivars: ‘Prairie Expedition’, ‘St. Croix’, ‘Princeton’,‘New Harmony’

Trees to Try in Petroleum County

Hybrid Asian Elms: Accolade Elm (*Ulmus davidiana* var. *japonica* 'Morton')

-plant DED resistant cultivars

-tolerant of alkaline soil, dry sites,& occasional drought

-Zone 4b, >50’Tx >30’W

-tolerant of urban conditions

-several other cultivars

Trees to Try in Petroleum County

Common Hackberry (*Celtis occidentalis*)

-ugly duckling when young

-establishes easily in urban landscapes; wide soil adaptability

-tolerance of heat, drought, salt spray, wind, ice

-Zone 3, 50’T x >40’W

-interesting bark

Trees to Try in Petroleum County

Kentucky Coffeetree (*Gymnocladus dioicus*)

-ugly duckling when young

-establishes easily in urban landscapes; wide soil adaptability

-tolerance of heat, drought, salt spray, wind, ice

-Zone 3-4, >50’T x >40’W

-tolerates alkaline soil, road salt and wet sites

Trees to Try in Petroleum County

Small Trees

‘Crusader’ Thornless Cockspur Hawthorn (*Crataegus crus-galli* var. *inermis*)- messy ½ inch crabapples

-establishes easily in urban landscapes; wide soil adaptability

-tolerance of heat, drought, salt spray, wind, ice; Zone 3,

-20’T x 20’W; tolerates alkaline soil, dry sites, road salt,

Trees to Try in Petroleum County

Small Trees

‘Toba’ Hawthorn (*Crataegus* x *mordenensis*)

-establishes easily in urban landscapes; wide soil adaptability

-tolerance of heat, drought, salt spray, wind, ice

-Zone 3-4, >50’T x >40’W

-tolerates alkaline soil, road salt

-produces messy ½ inch crabapples

Trees to Try in Petroleum County

Small Trees

‘Crimson Cloud’ Hawthorn (*Crataegus laevigata*)-almost thornless

-red and white flowers, green leaves

-tolerant of heat and some drought,

-Zone 4, 25’T x 20’W

-tolerates clay soil

-needs a lot of pruning

Trees to Try in Petroleum County

Small Trees

Japanese Tree Lilac (Syringa reticulata)

Cultivar ‘Ivory Silk’

-establishes easily in urban landscapes;

-tolerant of alkaline soils & Various soil textures

-Zone 3a, 25’T x >20’W

-prune after blooming

Trees to Try in Petroleum County

Small Trees

Apple Trees-select Zone 2-3 cultivars with excellent fireblight resistance; all need two tree species to cross pollinate

-Maybe Honeycrisp Apple Zone 3-4

-Sweet Sixteen

-Goodland

-Wolf River

-Norland

-Wealthy

-Gravenstein

-Dolga Crab Zone 2

Trees to Try in Petroleum County

Medium Trees

‘Sensation’ Box Elder

(*Acer negundo*) 45’T x30’W

-Zone 4b, male tree selection

-no boxelder bugs

-fast growing, pink fall color in high pH soils

-very tolerant of temperature extremes, drought and high pH soils

-can produce some suckers

Trees to Try in Petroleum County

Medium Trees

Prairie Dream Paper Birch

(*Betula papyrifera*) ‘Varen'

-Zone 2, 40’T x 30’W,green leaves,

-yellow fall color, white bark,

-doesn’t spread like aspen

-tolerant of deer browsing

-likes some afternoon shade

-pH soil adaptable

Trees to Try in Petroleum County

Medium Trees

Dakota Pinnacle Birch (*Betula platyphylla*) 'Fargo'

-Zone 3, 40’T x15’W

-green leaves, yellow fall color

-white bark

-tolerant of deer browsing, drought, and clay soil

-likes some afternoon shade

Trees to Try in Petroleum County

Medium Trees

Ohio Buckeye (*Aesculus glabra*)

-Zone 3, 30’Tx 30’W

-may not tolerate clay soils

-fall color yellow to orange

in high pH soils

-Produces nuts, don’t plant near sidewalks or driveways

-gets leaf scorch in heat and windy conditions

Trees to Try in Petroleum County

Conifers

Black Hills Spruce (*Picea glauca* 'Densata')

-Zone 3, 30'Tx 15'W,

-smaller than Colorado blue spruce & slower growth rate with brighter green needles & slightly shorter cones

-may not tolerate salt spray

-deer won't browse on it

Trees to Try in Petroleum County

Conifers

Ponderosa Pine (*Pinus ponderosa*)

-Zone 3, >60’Tx 25’W

-tolerates drought, wind

-deer won’t browse on it

-won’t tolerate clay soils

-too large for residential yards

Trees to Try in Petroleum County

Conifers

Austrian Pine (*Pinus nigra*)

-Zone 3b, 50’Tx 30’W

-tolerates some drought when established and wind

-deer won’t browse on it

-won’t tolerate clay soils

-too large for residential yards

-may have use in shelterbelts

Trees to Try in Petroleum County

Conifers

Native Limber Pine (*Pinus flexilis*)

-Zone 4, 30’Tx 30’W

-tolerates some drought when established and wind

-deer won’t browse on it

-tolerate dry soils

-better for residential yards

-may have use in shelterbelts

Trees to Try in Petroleum County

Conifers

Bristlecone Pine (*Pinus aristata*)

-Zone 4, 15’Tx 15’W

-tolerates drought, wind, alkaline, rocky soils

-deer won’t browse on it

-better for residential yards

-may have use in shelterbelts

Tree Planting

Tree Planting

Neal Fehringer
Certified Professional Agronomist, CCA
Fehringer Agricultural Consulting, Inc.
Billings, MT

-Sample water & soil to determine salts & sodium.
-Rather have good water and poor soil.
-Plants have different salts tolerances.
-Sodium is a separate issue from salts.
-Sodium affects soil structure.
-Can be toxic to plants separate from overall salts.

Tree Planting

Neal Fehringer
Certified Professional Agronomist, CCA
Fehringer Agricultural Consulting, Inc.
Billings, MT

Starting Place:

- **Sample water & soil to determine salts & sodium.**
  - **Rather have good water and poor soil.**
- **Plants have different salts tolerances.**
- **Sodium is a separate issue from salts.**
  - **Affects soil structure.**
  - **Can be toxic to plants separate from overall salts.**

Tree Planting

Neal Fehringer
Certified Professional Agronomist, CCA
Fehringer Agricultural Consulting, Inc.
Billings, MT

"Sodium adsorption ratio" (SAR) is a measure of the amount of sodium (Na+) relative to calcium (Ca2+) and magnesium (Mg2+) in the water extracted from a saturated soil paste.

-It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

-Soils that have values for sodium adsorption ratio of 13 or more may have an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure.

Source: U.S. Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. Available online. Accessed 9/13/2012.

Tree Planting

Sodium Adsorption Ratio (SAR):

- It is unitless as it is a ratio.
- Data must be in m.e./L (milli-equivalents/liter).

- Make sure you test your water quality before planting trees

$$SAR = \frac{Na^{+}}{\sqrt{(Ca^{++} + Mg^{++})/2}}$$

Tree Planting

Neal Fehringer
Certified Professional Agronomist, CCA
Fehringer Agricultural Consulting, Inc.

Sodium Adsorption Ratio (SAR):

- **SAR in your water should be < 13**
- **Yellowstone River: 1**
- **Well at Custer: 65**
- **CBM Wells in Powder River Basin: 7-102**
- **Spring at Reed Point: 110**
- **Wells in Bull Mtns: 50-75**

Tree Planting

Neal Fehringer
Certified Professional Agronomist, CCA
Fehringer Agricultural Consulting, Inc.
Billings, MT

Conductivity (salts) Measurements:

Be sure to test your soils before planting if you have a concern

- **Water: micro-mhos per cm (µmhos/cm)**
  - **1000 µmhos/cm = 1 mmho/cm (milli-mho/cm)**
- **Soil: mmho/cm**
  - **1 mmho/cm = dS/m (desi-Siemen/m)**

Tree Planting

Neal Fehringer
Certified Professional Agronomist, CCA
Fehringer Agricultural Consulting, Inc.
Billings, MT

Water Conductivity:

- Yellowstone River: 180-400 µmhos/cm

- Ground water:
  - Well inside Metra Racetrack: 3000 µmhos/cm
  - Spring NE of Shepherd: 3000 µmhos/cm
  - Well at Laurel HS: 3000 µmhos/cm
  - My well (unsoftened):
    - 600 µmhos/cm in summer
    - 2500 µmhos/cm in winter

Tree Planting

Neal Fehringer

Certified Professional Agronomist, CCA
Fehringer Agricultural Consulting, Inc.
Billings, MT

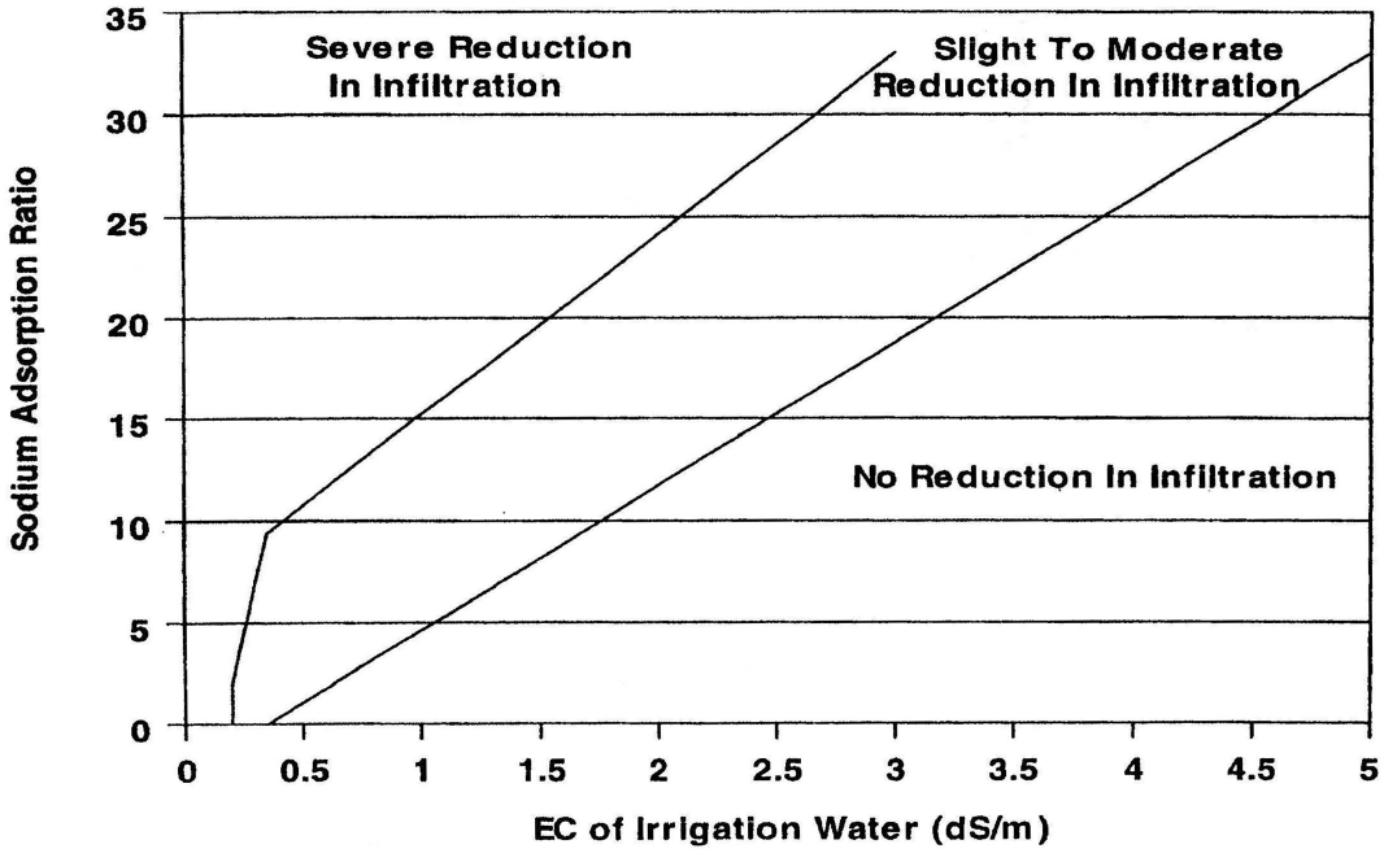
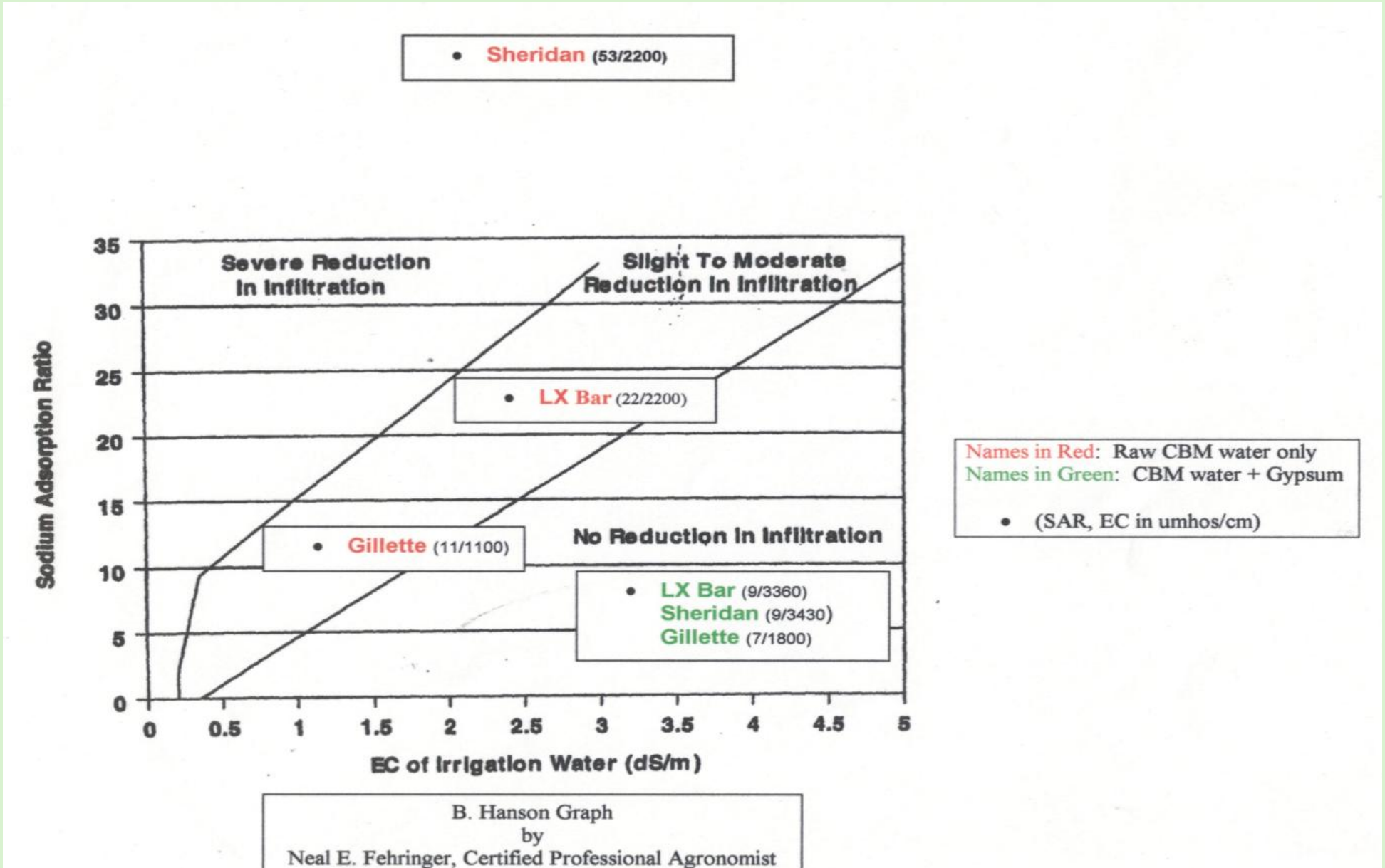


Figure 3, found on page 44 of Agricultural Salinity and Drainage's "How Water Quality Affects Infiltration" by Blaine Hanson, Division of Agriculture and Natural Resources Publication 3375, University of California Irrigation Program, University of California – Davis.

Tree Planting

Neal Fehringer



Tree Planting

Neal Fehringer

Soil "Salt" Definitions:

- **Saline Soil – EC of ≥ 4.0 mmhos/cm**

  (Gypsum will not help, just increase salts.)

- **Sodic Soil – EC of < 4.0 mmhos/cm w/ SAR of ≥ 12%**

  (Gypsum will help decrease sodium)

- **Sodic-Saline Soil – EC of > mmhos/cm & SAR of > 12%**

  (Gypsum will help decrease sodium)

Tree Planting

Neal Fehringer

Gypsum Rates:

- **Determined by lab by titration.**
- **Calculate from Exchangeable Sodium Percentage & Cation Exchange Capacity.**
- **SAR & personal experience.**
- **NOTE: Gypsum needs 6 months to work. Fall apply.**

Tree Planting

Neal Fehringer

Soil Texture Tendencies:

- **Sandy soil: Low in potassium, organic matter & water holding capacity.**
- **Clay soil: Prone to salt build-up.**

Tree Planting

Neal Fehringer

Organic Matter:

- **Want at least 3%.**
- **Add compost to increase organic matter.**
  - **Compost usually 25% organic matter.**
  - **Depends upon input materials.**

Some General Guidelines for Planting **Bareroot /Container/ Ball & Burlap** Trees

-Plant in Native Soil

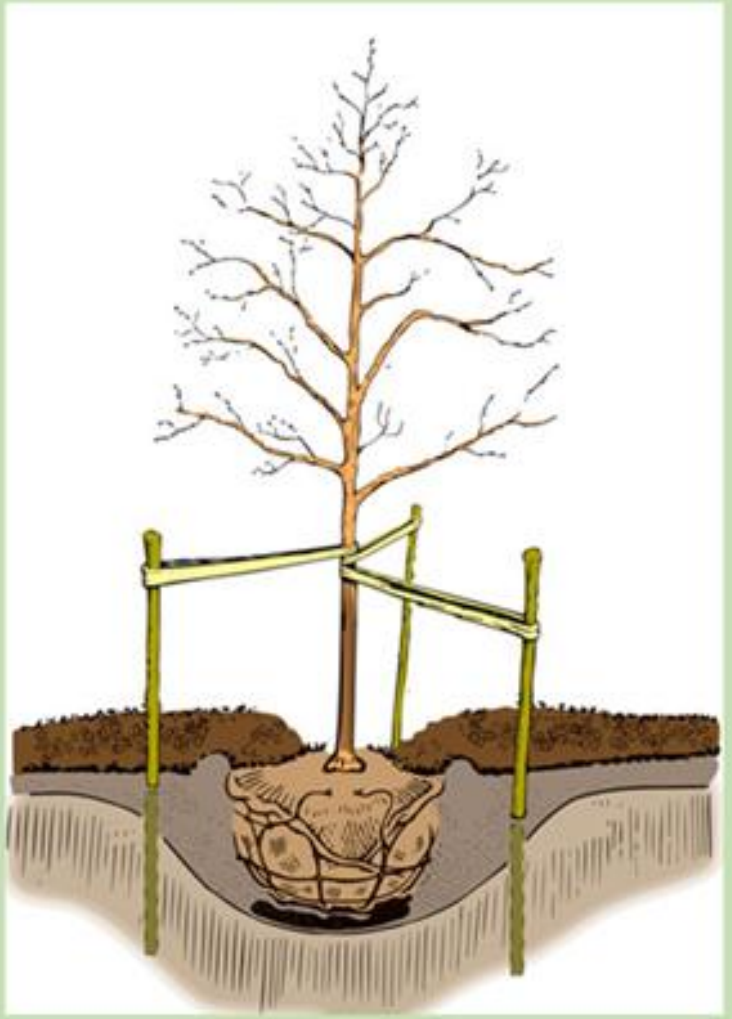
-Hole Should be at Least 2X Diameter of Root System

-Better too Shallow than too Deep

-If Possible, Protect from Deer / Other Critters when Young

-Eliminate Grass Competition- Grass takes 70% of Moisture

-Establish Central Leader for Trees when Planting



https://www.treesaregood.org/treeowner/plantingatree

Guidelines for Bareroot Trees & Shrubs

*-Cheapest **30-50% <Container Trees;***

***-**Hard to Find*

-Better Root Systems

(>2X as Many Roots as B&B)

-Lightweight

***-**Faster Growing than B&B*

-Plant Early Spring Before Breaking Dormancy

-Keep Moist

-Pot in Bark or Stump Grindings until Planting

-Gravel Bed Nursery extends Planting Season

-Bare Root Again when Planting

Some General Guidelines for Container Trees and Shrubs

-More Expensive than Bareroot

-Better Root Systems but may be Rootbound

-Faster Growing than B&B

-Plant Anytime During Growing Season

-Remove Girdling Roots before Planting

-Bare Root when Planting if Possible

- "It is imperative customers planting container trees remove the outer one inch of the root plug sides and bottom prior to planting. Cutting the root plug into a cube shape with a 12" pruning blade seems the fastest and most complete method (a reciprocating saw does an excellent job). This reduces the opportunity for circling roots.." (Glacier Nursery Catalog)

Some General Guidelines for Container Trees and Shrubs

-Can Remove 30% of Roots to get Roots to Spread out if Rootbound

-Trees can Die in 8-10 years if Circling Roots not Removed!

-Check out YouTube Video at:

https://www.arborday.org/trees/planting/containerized.cfm

Some General Guidelines for B&B Trees and Shrubs

-B&B Trees have < 20% of Roots Left after Digging!

Need 1' of Ball Diameter for Every 1" of Tree Diameter

-Plant Anytime During Growing Season

-Place the Tree in Hole as Shown in Video Below

-Remove the Twine, Upper Burlap, and Basket

-Check out YouTube Video at:

https://www.arborday.org/trees/planting/balled-burlapped.cfm

-After tree is in hole: "..remove the twine, burlap, and the top two horizontal rings of the wire basket using wire cutters" (Glacier Nursery Catalog)

Cost and Time Saving Guidelines for Trees and Shrubs

-Transplant Shock Lasts 1 Year for Every 1" Tree Stem Caliper

1" Caliper Bareroot Trees will Catch up with a 2.5" Caliper B&B Tree in 3 Years!

–Better Root Systems from the Start (Same for Properly Root Pruned Container Trees)

-You can Buy 3-5 1" Container Trees for the Cost of 1 2.5" B&B and They are Easier to Plant!

Cost Saving Guidelines for Trees and Shrubs

$5 1 gal. Container Black Hills Spruce planted same year as $80 B&B Colorado Blue Spruce

Cost and Time Saving Guidelines for Trees and Shrubs

-Townsend Lesson Learned: 15 years later, 1-gallon Container Grown Black Hills Spruce Trees are Almost as Large a 5' B&B Colorado Blue Spruce Planted the Same Year!

-Moral: Money Spent on Better Root Systems Pays Dividends over Time.

Other Guidelines for Trees and Shrubs

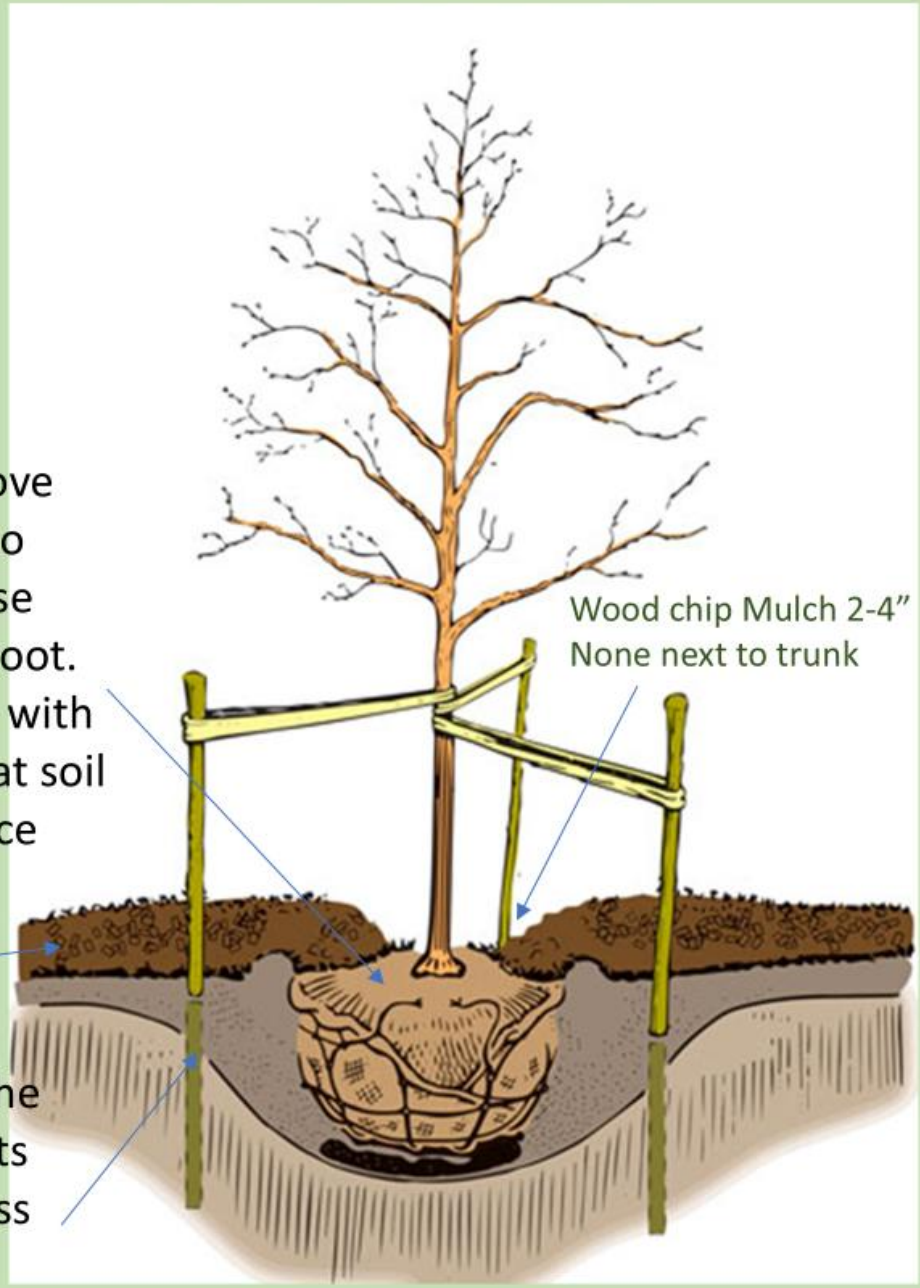
-Can Transport Tree Unprotected if Driving <35 mph and Tree is Transported on Cool Day

-Otherwise ***Wrap & Protect from Wind and Sun***

-Stake with at Least 2 Stakes *(3 if Tree needs to be Fenced)*

-Use Material that won't Harm Bark; Leave Ropes Loose so Tree can Move

-Stake 1 year until Leaves Full Size Next Season



Other Guidelines for Trees and Shrubs

-'Weed Wacker Disease' or 'Toro Blight' is Leading Cause of Death of Young Trees

-Destroys Young Bark and Cambium Layer

-Keep Grass Away from Tree Trunk;

-Mulch 2-4 inches Deep with Arborist Chips

-Keep Mulch Away from Trunk

-Tree will Grow Twice as Fast without Grass Competition

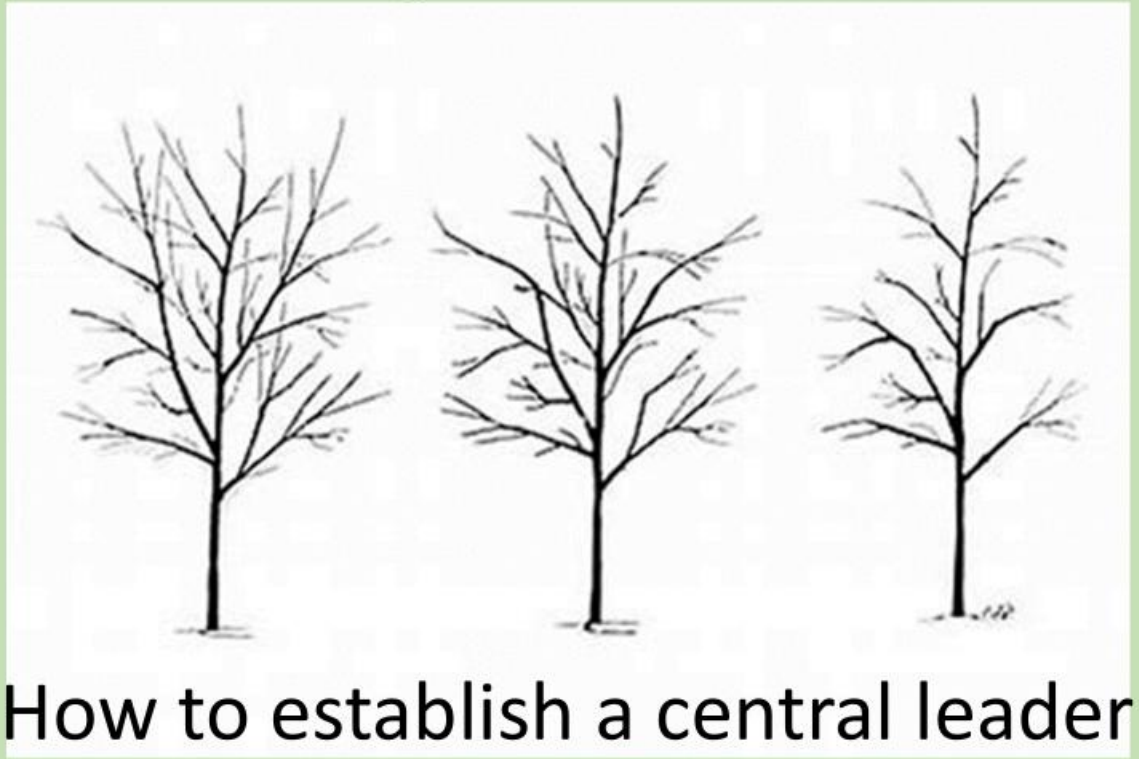
Tree Pruning

Why prune?

1) Training Newly Planted Trees

-Before Planting –Remove Dead, Crossing, or Diseased/Damaged Branches;

-At Planting Time-Don't be too Aggressive but Establish Central Leader using Subordinate Pruning



How to establish a central leader

Why prune?

1) Training Newly Planted Trees

-Second year - Prune early in Spring.

-Fix Structural Problems (Co-dominant Trunks; Narrow Crotches (< 30 degrees) and Establish Scaffold Branches

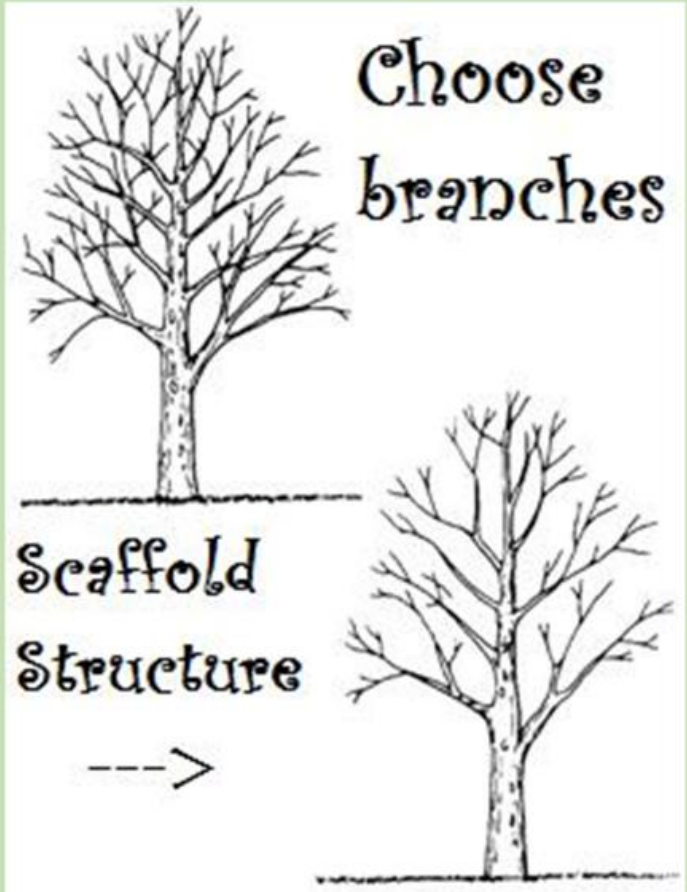
-Yearly Check for:

Pedestrian Hazards;

Increase Light Levels in Interior;

Reduce Plant Size (?);

Aesthetics



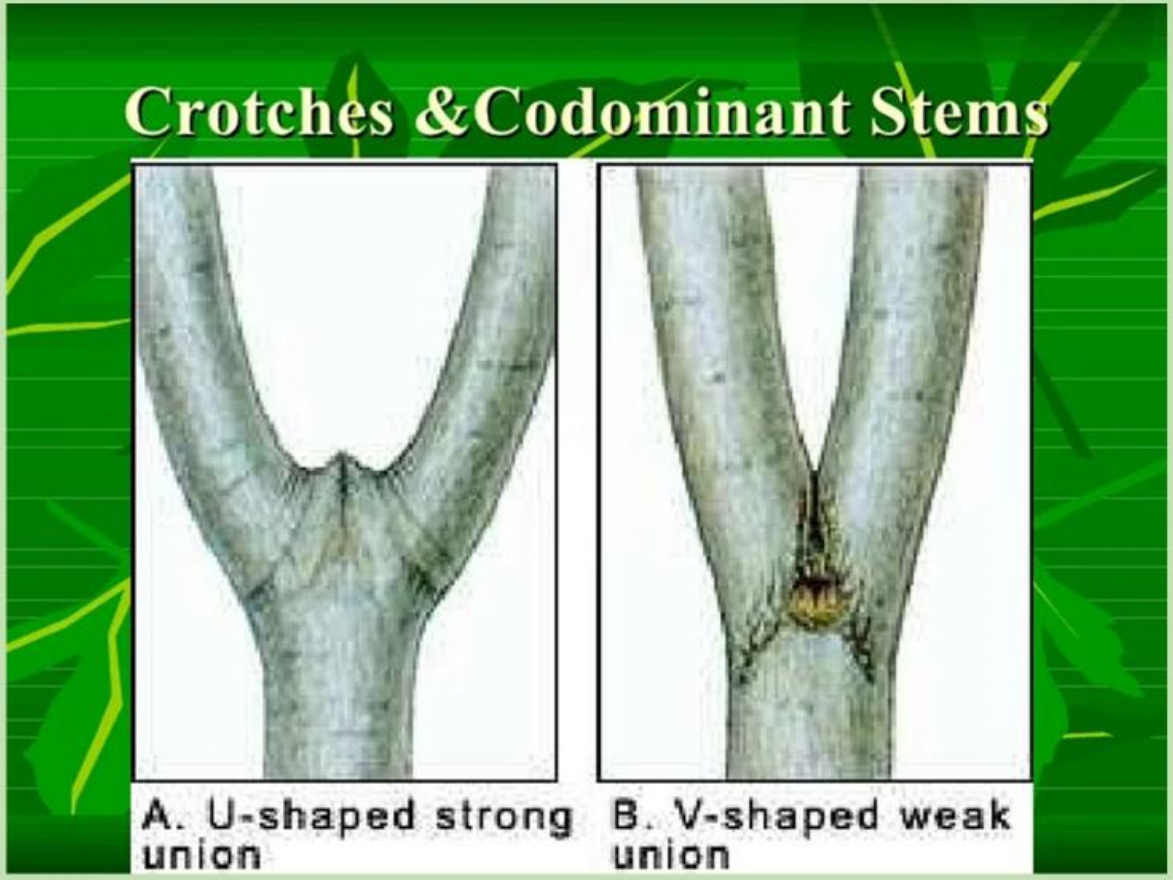
Pruning

1) Training Newly Planted Trees

Problem with Co-Dominant Trunk

-Lack of Proper Attachment due to

Included Bark can Cause Structural Failure Later



Why prune?

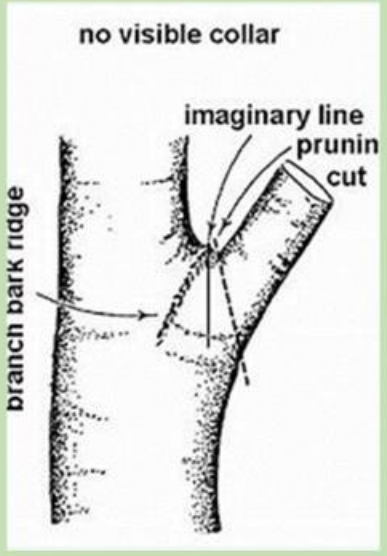
1) Training Newly Planted Trees

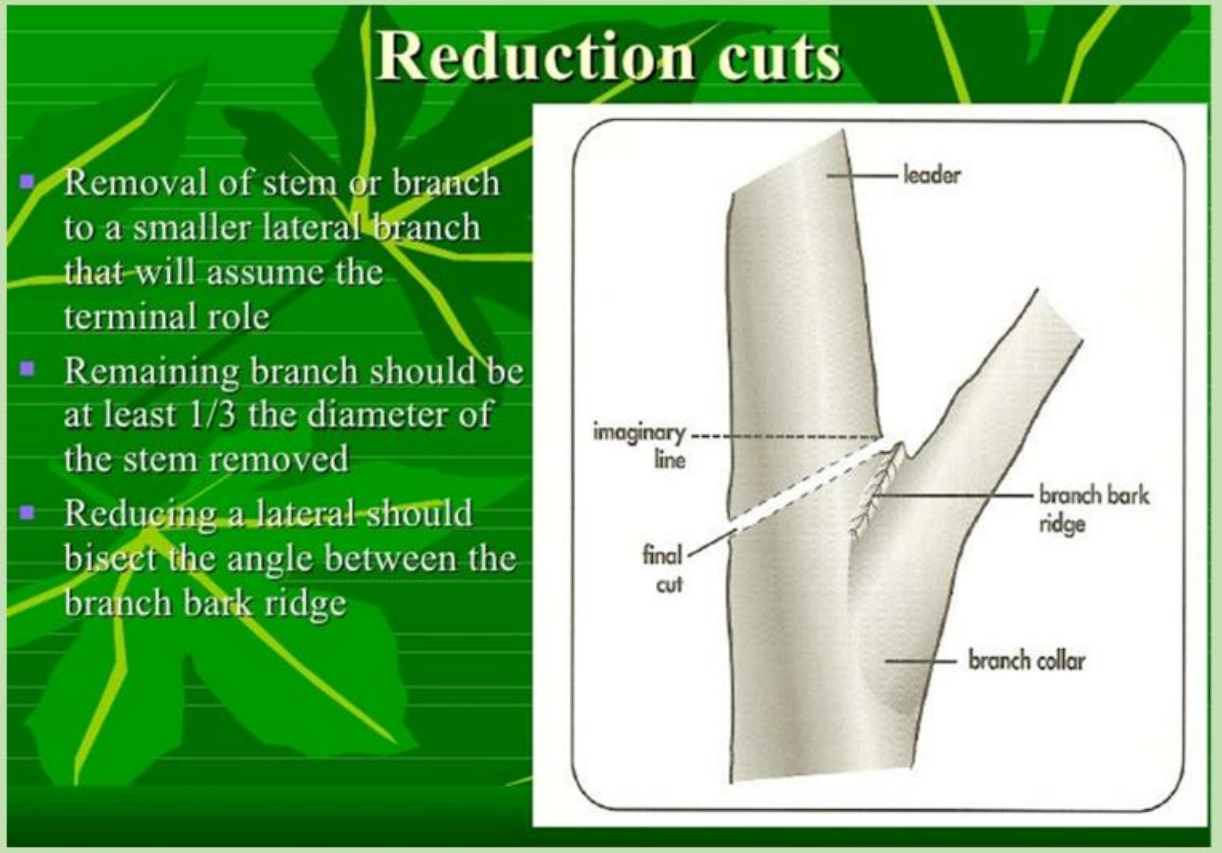
-How to Remove Co-dominant Trunk over Time

-Pick one Trunk to be Dominant

-Stunt Other Trunk by >50% by Pruning to Lateral Branch Using Reduction Pruning

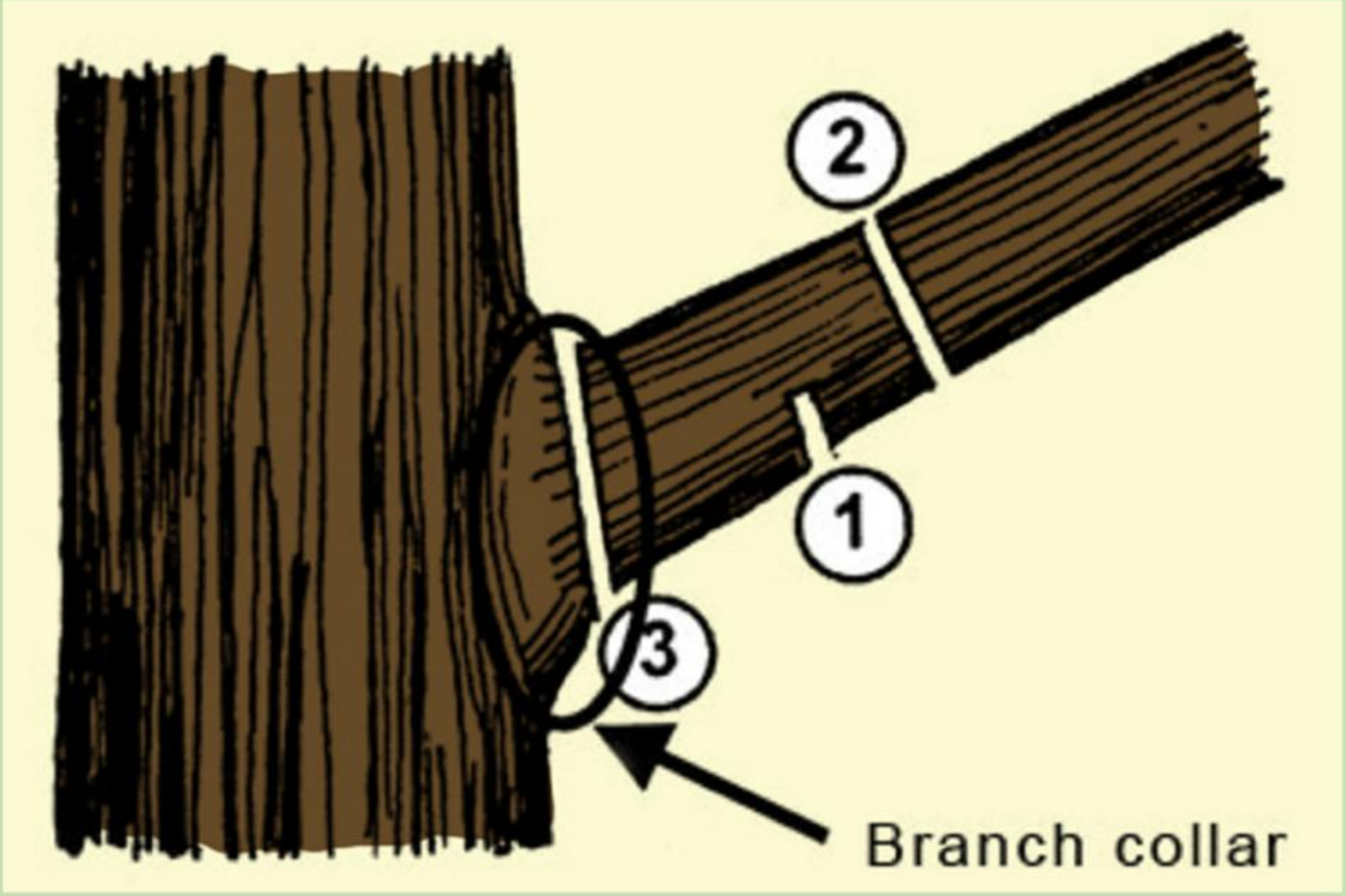
-Remove When Co-Dominant Trunk is 1/3 the Size of Dominant Trunk





Pruning

The 3-Cut Method to Remove a Large Branch from a Tree



Why Prune?

2) To Maintain Plant Health

-Sanitation; Use Rubbing Alcohol or Spray Disinfectant to Treat Tools

-Remove Dead, Dying, or Diseased Wood; Treat Pruners after each Cut.

-Thin Evergreen and Other Shrubs to Allow Light and Air Circulation in Interior

3) To Improve Quality

-Pruning Improves Flower, Fruit, Foliage, and Bark Color Quality

4) To Restrict Growth

-Pruning helps Keep Plants in Space Allocated for Them or to Keep Hedges Looking Good

Pruning

Do Pruning Wounds Need to be Treated?

No

-Oxygen is Necessary for the Proper Healing Process to Take Place.

-Painting a Wound with Any Kind of Material that Interferes or Impedes Oxygen Access will Delay or Even Prevent Wound Closure by Callus Formation.

https://ohioline.osu.edu/factsheet/HYG-3311-09

Pruning

Remove Narrow Crotches

-The Proper Branch Angle for Most Ornamental Trees?

Between 30 and 70 degrees

Bad branch angle. A narrow branching angle can be weak. Bark becomes included and the branch is weakly attached.

Branch less than 30 degrees

Good branch angle. A wider branch angle is conducive to a stronger branch attachment.

Branch between 30-70 degrees

Shelterbelts

Windbreaks and Shelterbelts: Are they really worth it?

Peter Kolb, DNRC Forestry

https://www.montana.edu/extension/lila_extn/WindbreaksandShelterbeltsArtherereallyworthit.html

Other Handouts

Shelterbelts

Targeted Implementation Plan

- The NRCS Targeted Implementation Plan (TIP) in Fergus County, Montana aims to assist producers in establishing living windbreaks and shelterbelts within or adjacent to cropland in the Fergus and Judith Basin Counties.

- https://www.nrcs.usda.gov/sites/default/files/2023-06/Montana-TIP-Fergus-Judith-Basin-Shelterbelt.pdf