Raising Mast Crops for Wildlife :
Understanding the work involved!

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Who Am I

- MSU Ph.D. Forestry- *DEER AND SEDGE EFFECTS ON TREE SEEDLING DYNAMICS IN NORTHERN TEMPERATE FORESTS*
- ISU Associate Professor / Extension Forester
  - Improving timber resources
    - Income
    - Recreation
    - Wildlife
  - Non-Timber Forest Products
- MSU – Director of Forestry Research and Extension
  - –Forest Biomass Innovation Center (FBIC)
    - Applied silviculture
    - Traditional and Non-traditional forest products
    - Private landowner education

FBIC

Mast crops take many forms

- Hard mast
  - Oaks, hickories, walnuts, beech
- Soft mast
  - Fruits, berries
- Right species for the right spot
- All need to be planted correctly !
- All need to be maintained !!!

Bur Oak
2-3 yr acorn crop interval
Age 35

Red Oak
3-5 yr acorn crop interval
Age 25

Swamp White Oak
3-5 yr acorn crop interval
Age 20

White Oak
4-10 yr acorn crop interval
Age 20

Who wants to wait for 20 - 40 years for acorns!

What makes oak trees mast early and often?

- Perfect growing conditions
- Excess nutrient availability
- Stress – sometimes… but other issues arise so don't aim to stress oak trees

What are perfect growing conditions

- Good soils
- Full sun
- No competition!!!!!
- Inch of rain per week

“Oak Trees Grow Slow”

2 years after planting I began a fertilizer regime

- Spring only
- Bare root seedlings get ½ cup 19/19/19
- As trees grow in size, fertilizer rate increases
    - 1 pound coffee can per selected tree ~4 inch caliper

Take into account existing wildlife pressures, soils, moisture, time, money, landscape level practices

Plant bare root seedlings
Larger potted trees
Direct seeding

•Shelter, Fence, Repellants

Play to your location's strength!!!

Even on 30-60 acres :

What did I plant

1st tree planting acres (8x6 spacing)

- Red, white, swamp, bur oak (Also the protection preference)
  - North and south seed sources
- Walnut, pecan
- Shell & shag bark hickories
- Kentucky coffee
- Bald cypress
- River birch, sycamore, silver maple
- Shrubs
  - Wild plum, dogwood, hazelnut,
  - elderberry, ninebark, viburnums

2nd and 3rd tree planting acres (8x8 and 9x8)

Same tree and shrubs as previous planting + apples & plums

To increase thermal cover, travel corridor safety

- white pine, red cedar, norway spruce

- 300 lbs
- 186 inches
- Late muzzeloader

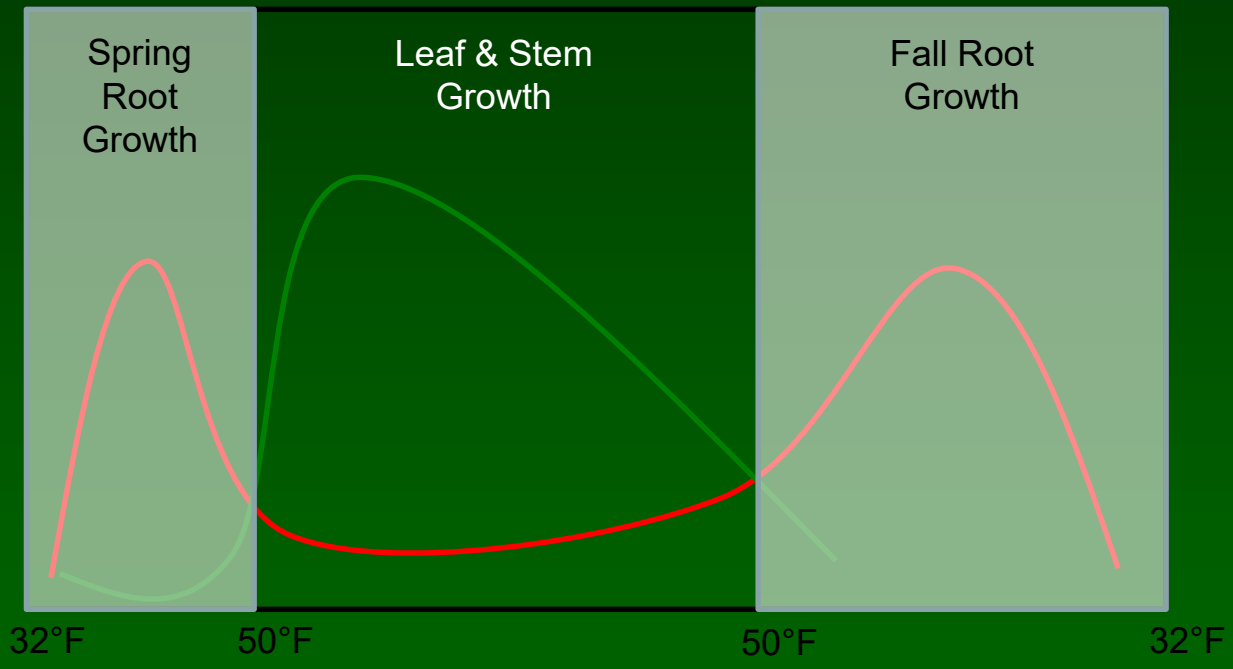
2019 target

Wildlife are Opportunistic

Planting

- When
- Common Problems
- Maintenance

Annual Cycle of Root, Leaf & Stem Growth



Bare-root seedlings from Nursery

- 1-0 & 2-0 stock (one or two years in nursery bed, no transplanting)
- Bundled in Bags
- Soak Roots – minimum 2-4 hours before planting


Once out of the bag - seedlings roots stay wet until in the ground


Packing Wheel
Closes Slit
Around Seedling
Planting Shoe
Opens Slit to
Accept Seedlings
Large Coulter Wheel
Cuts Through Sod/Soil


CORRECT
planting position.
INCORRECT
planting position.
Seedling Box

Common Problems

Too deep

Root Collar

Common Problems

Too shallow

Root Collar

Common Problems

Crooked
&
Shallow

Common Problems

J-root

Maintaining: Weed Control

- Control for at least 3 growing seasons
  - Herbicides (Clear, White, Yellow)
  - Mechanical (~~mowing~~ or disking)
  - Annual weeds are fine

What Fruit to Plant

- Learn the fruit ripening times!
  - Apples
  - Persimmon
  - Plums
- Plant a diverse mix that fruits across the season!

Rootstocks

- Controls the size of the tree
- Controls some soil borne pathogens
- Suckering

Scion wood

- Uniform fruit type
  - “named varieties”

Rootstock controls size

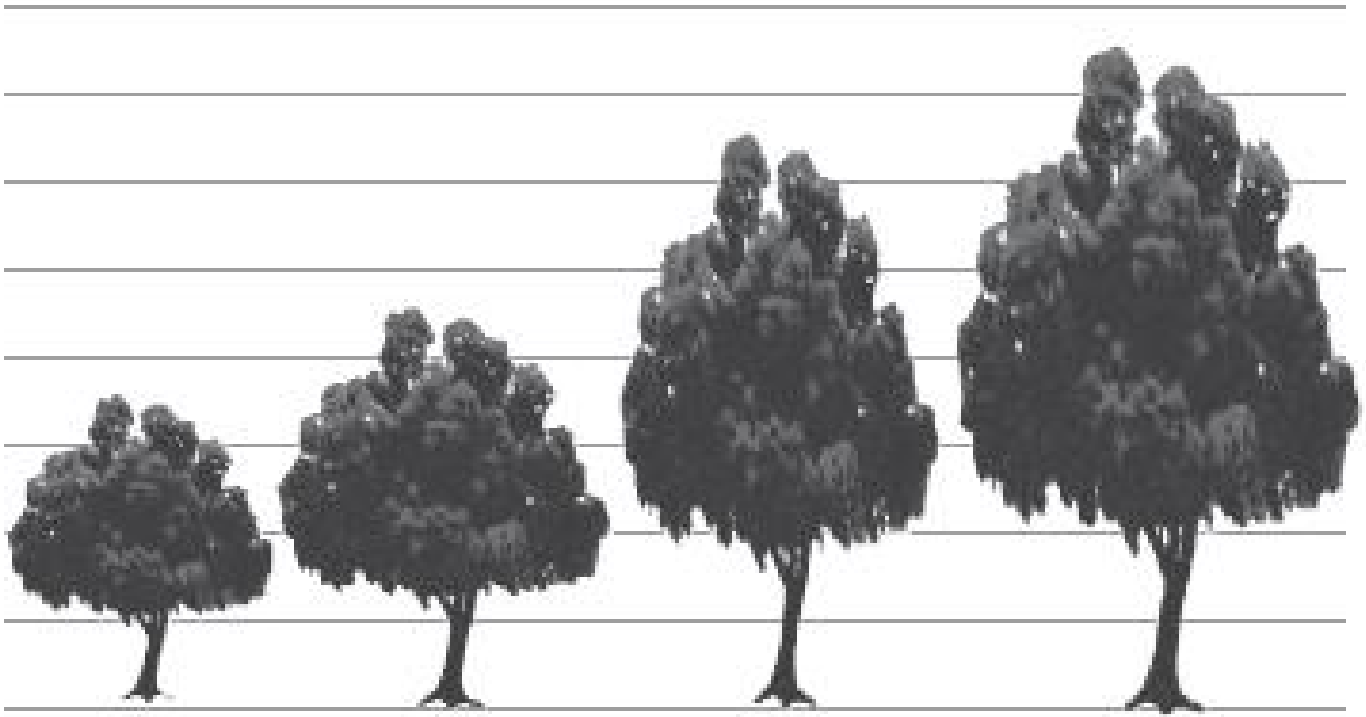
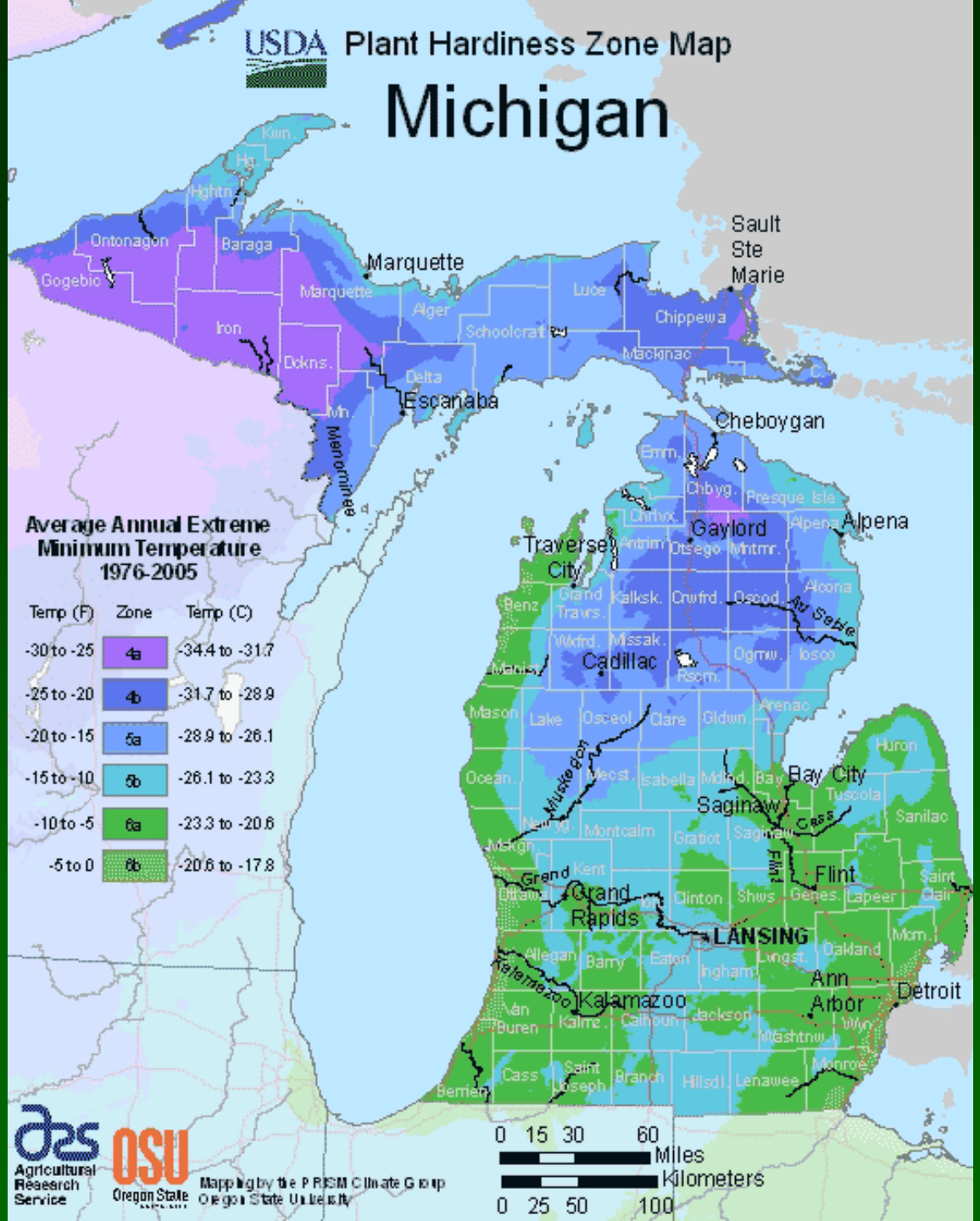


Figure 1. Effect of different dwarfing rootstock on the same apple variety.

Hardiness Zones



Fruiting dates of U of Minn. Hardy Apples

- Mid August
  - Rave, First Kiss
- Early – Mid Sept.
  - Chestnut Crabapple
  - Red Baron
- Mid to Late Sept.
  - Sweet Sixteen
- Late Sept. – Mid Oct.
  - Frostbite, Snowsweet, Fireside
  - Keepsake, Prairie Spy

More choices for Zones 5 and 6

When you can select "free" apples Jonafree, macfree – it is More resistant to common Diseases!

Fruit Tree Pruning - Apples

Managing Light Availability

Old style - one base breaks into 3 or 4 lateral trunks at 3’ above the ground
New style - one main stem with scaffold branches
Dwarf and some semi dwarfs designed for trellis systems
Semi dwarf to full standards are self supporting

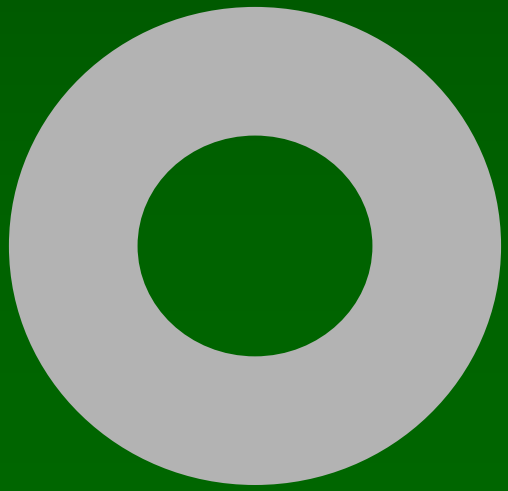
Pruning Apple Trees in a Nutshell

What to remove on a previously pruned tree – Old Style

1. Water sprouts
2. Branches that go straight up or down
3. Branches that are crossing/rubbing on other branches
4. Branches directly above/below other branches

   2-3 feet spacing above/below for semi dwarf and larger
5. No more than 30 - 40% removed in any one year

Top View

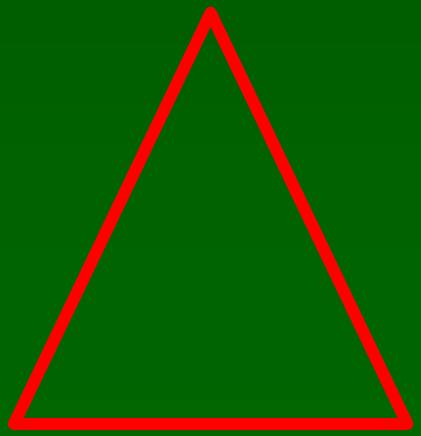


Pruning Apple Trees in a Nutshell

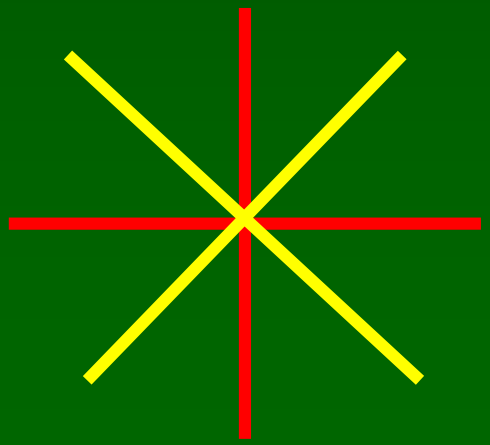
What to remove on a previously pruned tree – New Style

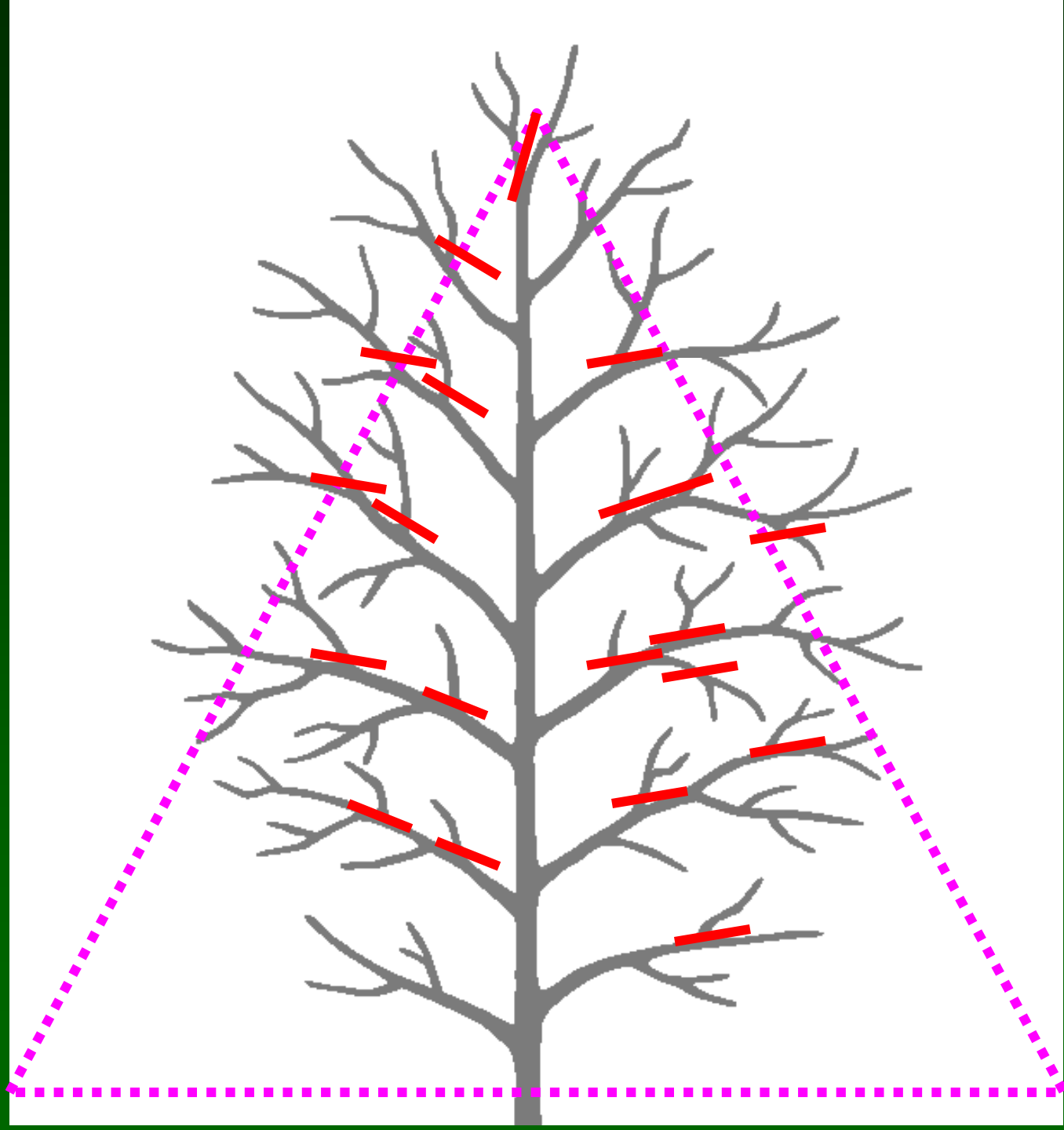
1. Water sprouts
2. Branches that go straight up or down
3. Branches that are crossing/rubbing
4. Branches directly above/below other branches
   that are not spaced at least 2-3 feet
   above/below (semi dwarf and larger)

Side View



Top View





Fruit Tree Pruning - Pears

Managing Light Availability

1st rule – Pears do not understand what you are trying to make them do

2nd rule – Pears will grow up at all cost

3rd rule – Pears would rather give up and die than conform to your will

Fruit Tree Pruning - Peaches

Managing Light Availability

-Peaches have strong apical dominance

-Peaches have weak wood

-Prune to hollow the center and create a vase shape

-Prune new wood back 30-50% to limit fruit production and breakdown

Planted Spring 2015
Picture at right Spring 2016

4-5 branches low

Minimize vertical branching

Reduce all new growth back 30-50 %

Planted Spring 2015
Spring 2017 – Pre pruning

Planted Spring 2015
Spring 2017 – Post pruning

Pruning Overgrown Shrubs

Step 1- Gas up the saw and wait for spouse to leave!

Step 2- Working quickly but safely cut as close to the ground as possible and removal all debris

****If step 2 is done correctly you will be at the store buying a new saw chain when spouse returns home – enter home carefully

Step 3- Wait! Coppiced shrubs will resprout from the root collar

SHRUBS

- Dogwoods
- Highbush Cranberry
- Ninebark
- Lilac
- Hazelnut
- Wild Plum
- Nanking Cherry
- Elderberry
- Aronia berry

Hazelnut (*Corylus americana*)

- Height 8-10’
- Space 6’ within row, 8’ between rows
- Well drained soil
- Full sun
- Edible nuts (mice and squirrels!)
    - Cultivars Grand Traverse and Skinner
    - Grand Traverse
        - Blight resistant –
        - Uniform nut size
        - Excellent Taste
        - Low to moderate winter dieback

Elderberry (*Sambucus canadensis*)

- Height 5-12’
- Space 6’ within row, 8’ between rows
- Prefers moist soils, can tolerate dry soils
- Full sun to partial shade
- Edible berries (birds!)
  - Jams
  - Jellies
  - Juice
  - Wine

Wild Plum (*Prunus americana*)

- Height 10-15’
- Space 10’ within row, 8’ between rows
- Prefers moist soils
- Full sun but can tolerate light shade
- Edible fruit (birds!)
- Moderate ability to spread
    - Forms a thicket
    - White flowers before leaf set

Aronia
(Aronia melanocarpa)

- Height 3-4’ up to 8’ – cultivar dependent
- “Viking, Nero, Autumn Magic
- By year 5 – 30-40lbs per plant
- Space 10’ within row, 8’ between rows
- Wide range of soils (pH 6-6.5 optimal) tolerates 5-8.5
- Full sun but can tolerate light shade
- Edible fruit (after freezing birds will eat!)
- Deer damage to seedlings

Highbush Cranberry
(Viburnum opulus)

- Height 10-12’
- Space 8’ within row, 10’ between rows
- Prefers moist soils, well drained soils
- Full sun to shade but flowering and fruiting is best in full sun
- Edible berries (birds!)
    - Late August early September

Ninebark
(Phsocarpus opulifolius)

- Height 8-10’
- Space 8’ within row, 10’ between rows
- Prefers moist soils, well drained soils
- Full sun to partial shade but flowering and fruiting is best in full sun

Lilac
(Syringa spp.)

- Height 8-10’
- Space 12’ within row, 12’ between rows
- Prefers moist soils, well drained soils
- Full sun for best flowering

Dogwood *(Cornus spp.)*

- Height 10’-15’
- Space 12’ within row, 12’ between rows
- Prefers moist soils, well drained soils
- Full sun to partial shade

Shrub Maintenance

- Regular pruning cycle for most shrubs
  - 3-5 year removal of old wood shoots
  - Renewed sprouts flower and fruit more
  - Control height and vigor
  - Less disease problems when pruned
  - Prune just after flowering but before fruit set

More hardwoods for Wildlife

Black Walnut (*Juglans nigra*)

- Several cultivars selected for nut production
- Easy cracking vs. Total production vs. Survival
- 30’ x 30’ spacing
- Prefers moist soils
- Full sun
- Edible nuts (squirrels and mice!)
- Disease issues (anthracnose)
- Juglone issues
    - (don’t plant a garden nearby)

Kentucky Coffee Tree (*Gymnocladus dioicus*)

- 15’ x 15’ spacing to 30’ x 30’
- Wide range of soils
- Full sun

Shagbark Hickory (*Carya ovata*)

- 15’ x 15’ spacing to 30’ x 30’
- Prefers moist well-drained soils
- Full sun
- Edible nuts (squirrels and mice!)
- Associates with Oaks

Chestnut
(Castenea mollisima)

- Easy cracking vs. Total production vs. Survival – Cultivar dependent!
- Badgersett hybrids for northern zones
-Planting 20’ x 20’ spacing,
-final spacing 40’x40’
- Well-drained soils critical
  - Dry, sandy, gravelly soils fine
- pH 5.5-6.5
- Full sun
- Edible nuts

Once the nuts freeze they turn to mush!

Protecting young seedlings

Siding venting (good in theory, takes constant maintenance!)

Raccoon damage going after wasps

Bird netting creates corkscrewed trees

What happened here?

- Antlers,
- Post too short
- 2 zips not 3

Carpet squares & half shelters

- Rodent damage to base
- Stem issues if carpet does not expand
- Soil temp if carpet is dark

Perforated s

- 5 ft tall in high deer areas
- Rounded top - not cut top
- 5 per stack – match size to species
- Mouse nest if you don’t clean the fallen leaves
- Girdled stems
- No netting = Dead blue birds
- Vented or you get dieback

White Drain Tile

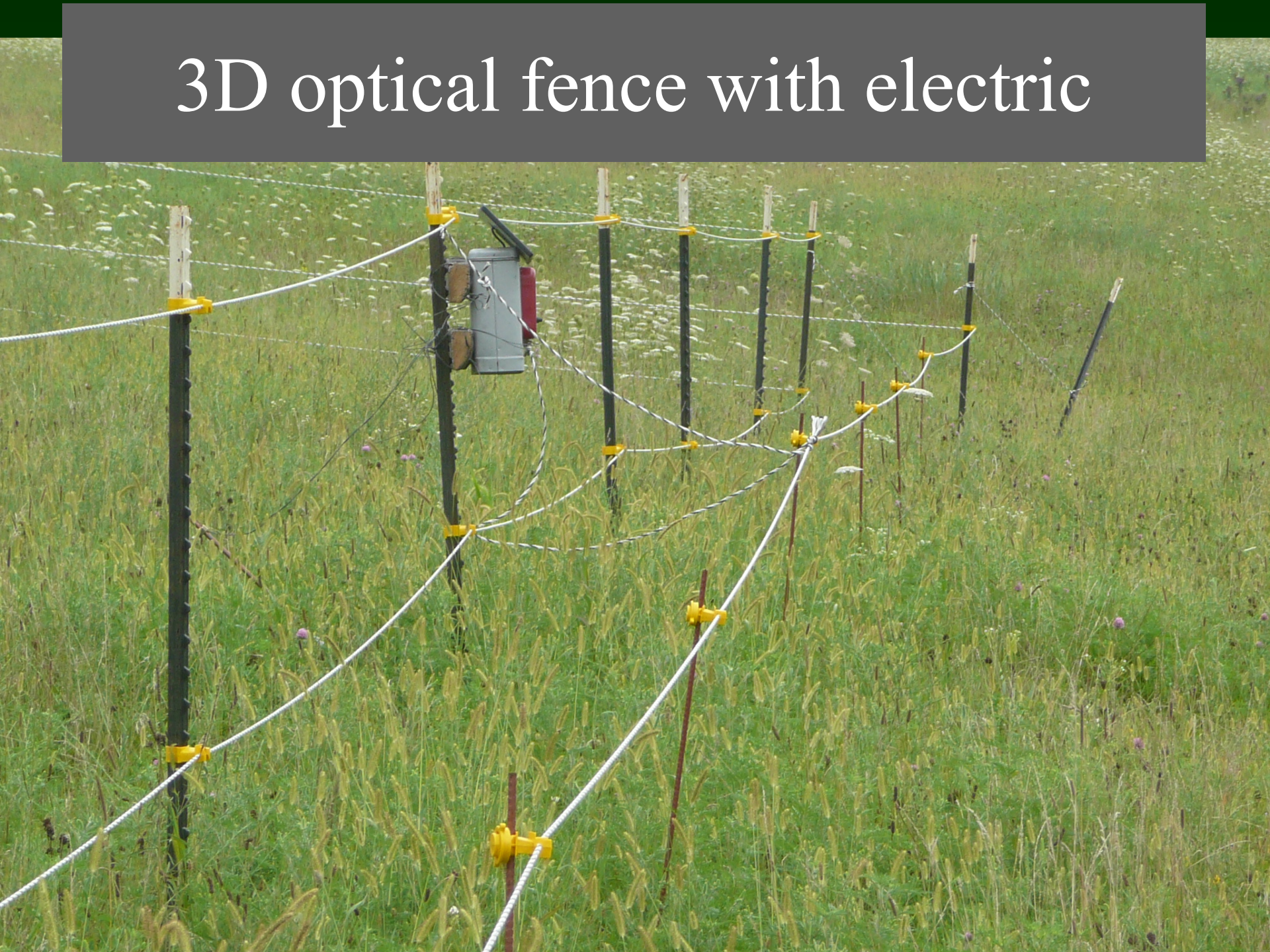
- Perforated and non-perforated
- Slit before installation

Single dimension electric (small areas only)

Better if they can see the other side fence

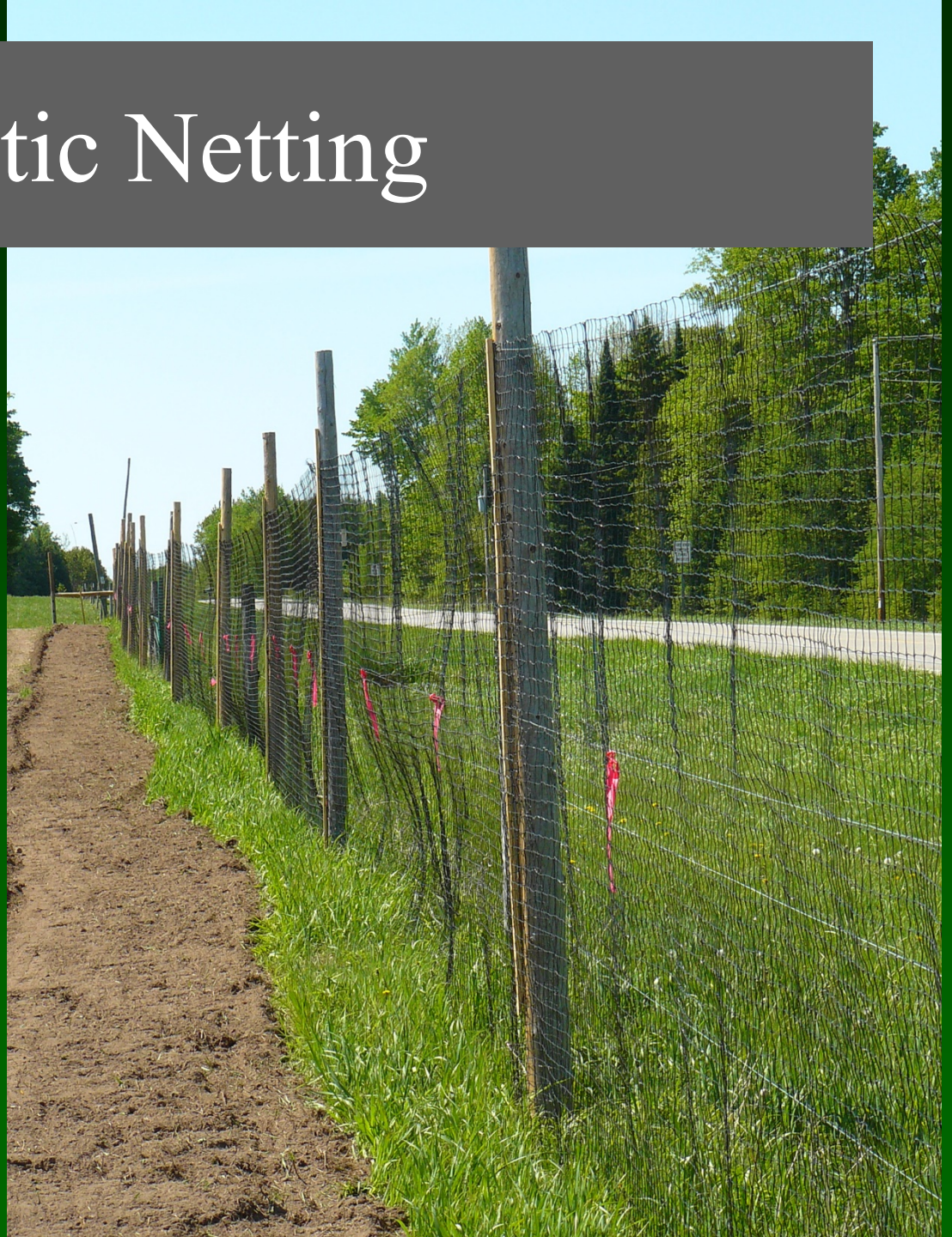
3D Fencing Options

3D optical fence with electric



Plastic Netting

- 7’ – 8’ tall
- 35 - 50’ between post
- $400/165’ of 8’ tall net
  - 5-10 years lifespan




- High tensile wire support
- Flagging to “learn”

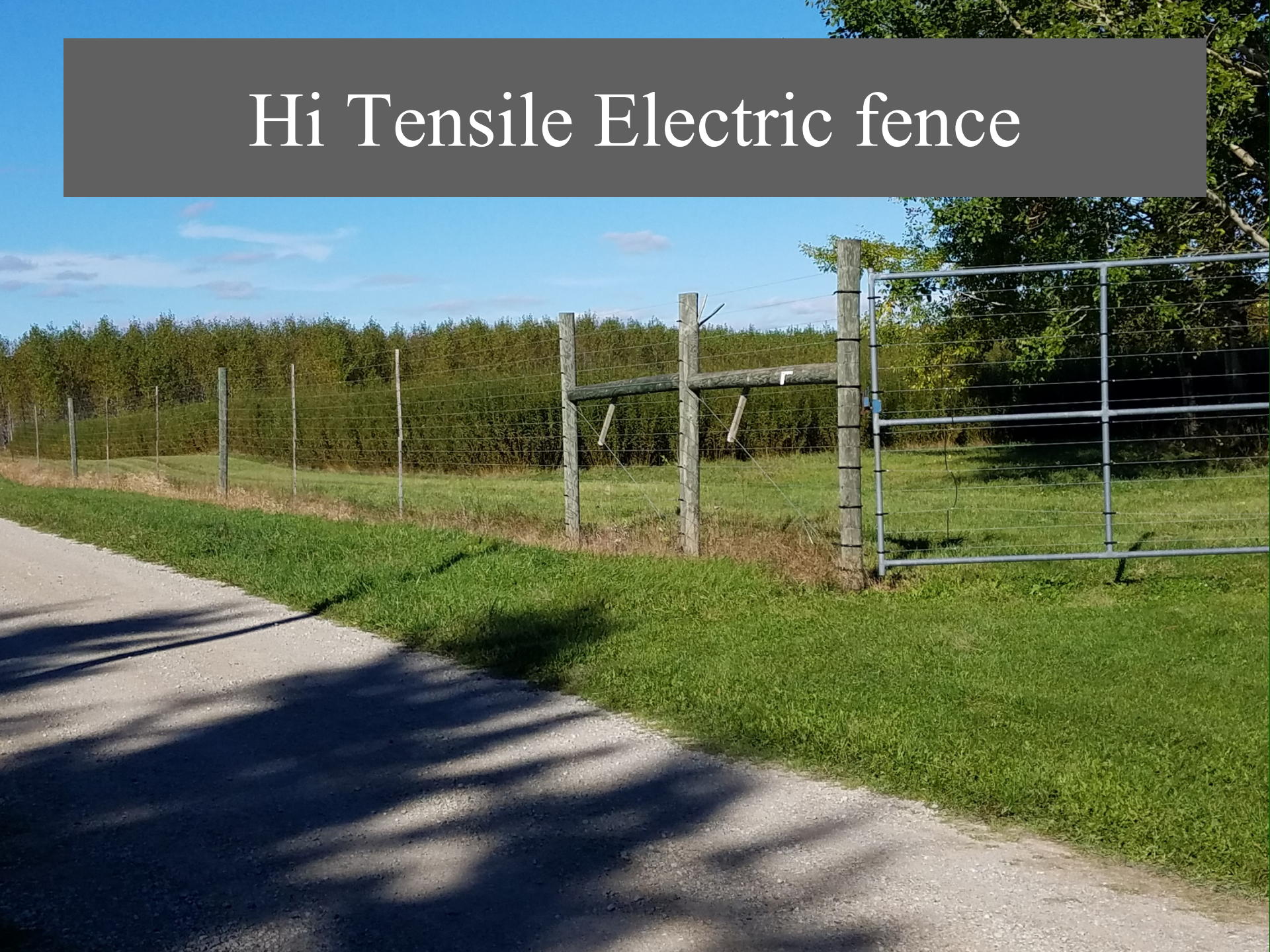
- If chased, the deer …

- Learn to use the same path

- Weekly repair schedule

- Double strand electric on outside at 18” and 30”

Hi Tensile Electric fence



Electric Fence –

-10k volts

- Reduces not eliminates deer

- Use exclosure for predator avoidance
- Learned behavior
- Cattle woven wire is good as a secondary
- “re education” campaign for any deer getting in

Chemical Deterants

- Deer Off ($258/2.5 gallons – covers 40,000 sq ft.)
  - Scent and taste (smells bad (rotten eggs) and burns the mouth)
  - ~90 day
  - Timing is key and varies by location and species
    - High deer # close to wintering habitat = fall thru spring
    - Lower deer or farther from wintering = Spring thru early summer
- Plantskydd

  ($349/22lb treats 4 - 6000 plants)
  - Scent (blood)
  - 6 months

Bud capping

At Installation

Second Season

The Beginning - 1990

After – October 2018

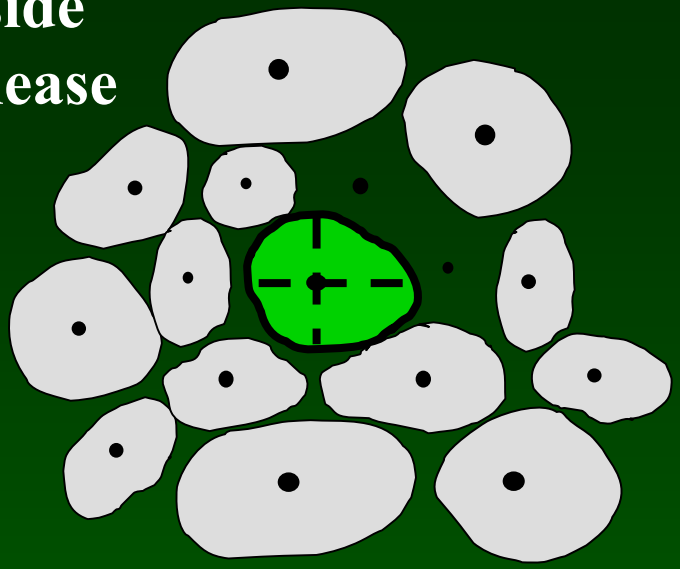
The Ultimate In Deer Protection

Timber Stand Improvement

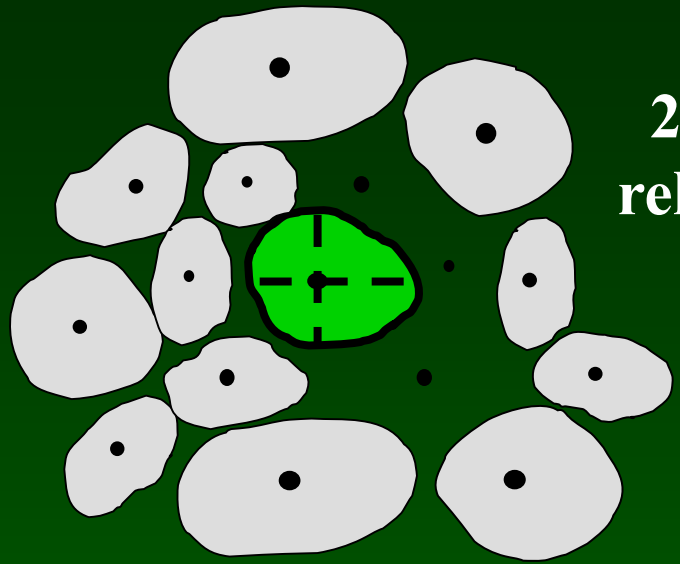
CTR = Crop Tree Release

- Improves the growth rate and form of desired species
- Expands canopy to expand mast production
- Controls species composition

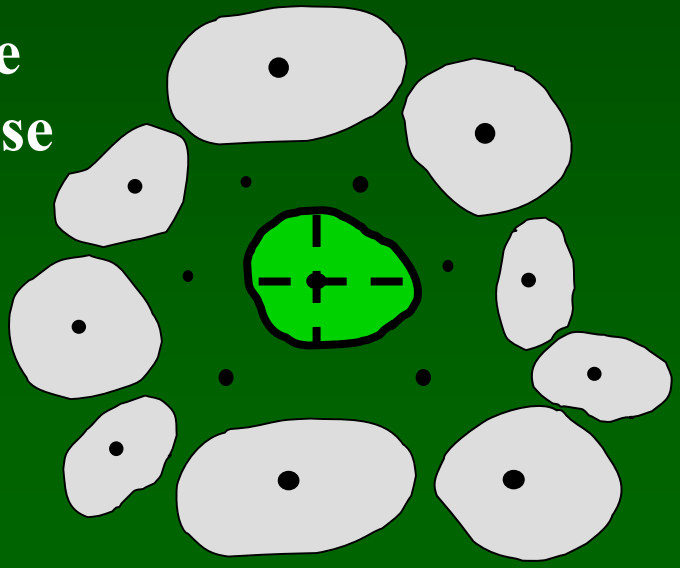
1 side release



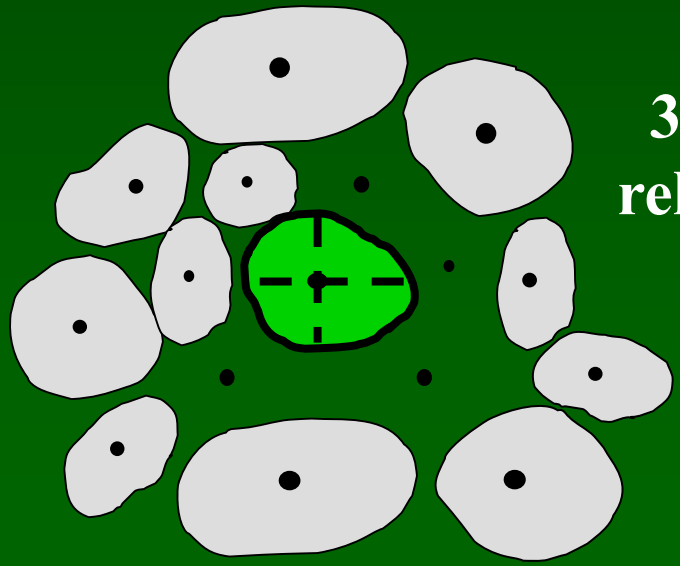
2 side release



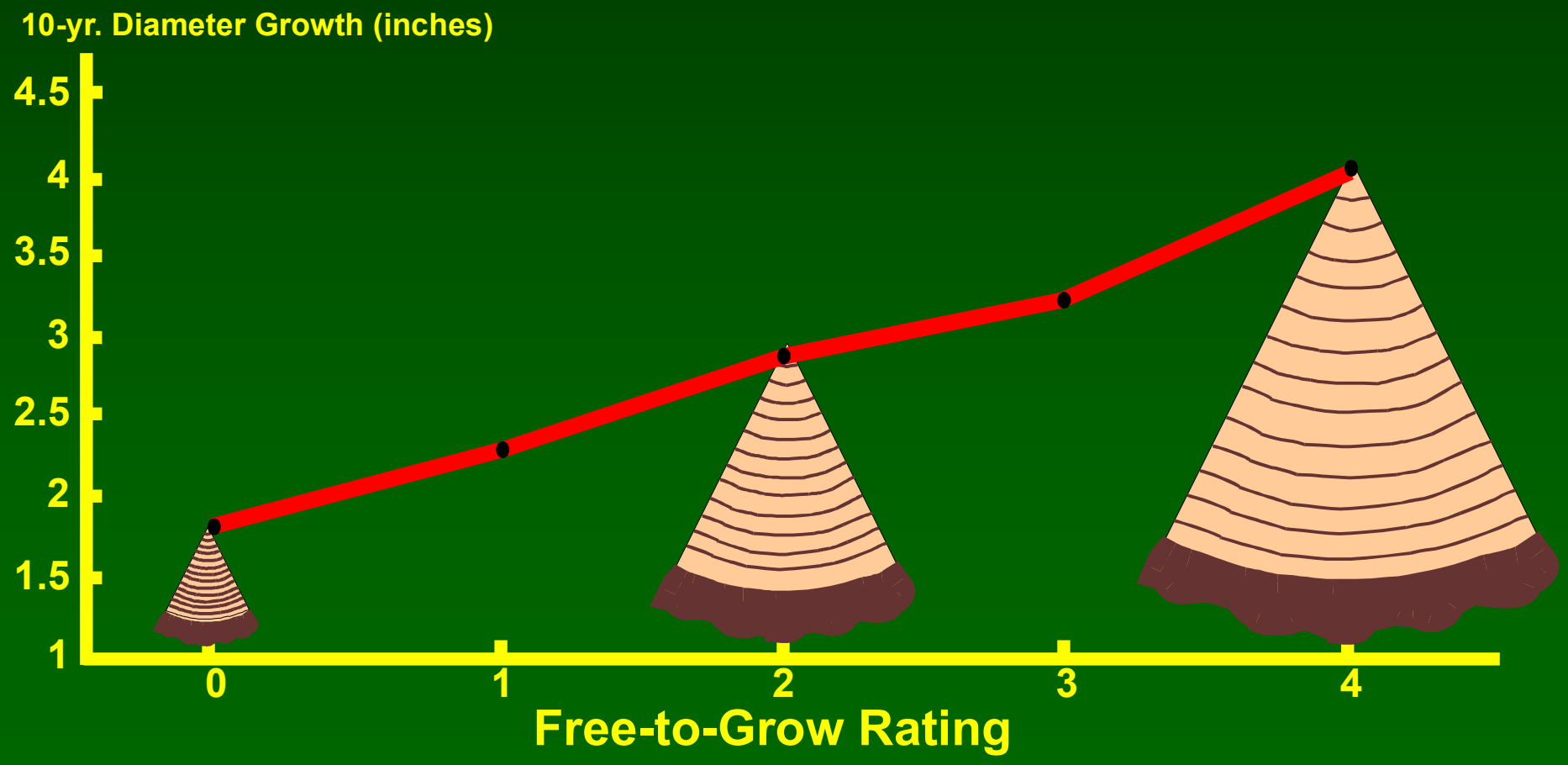
4 side release

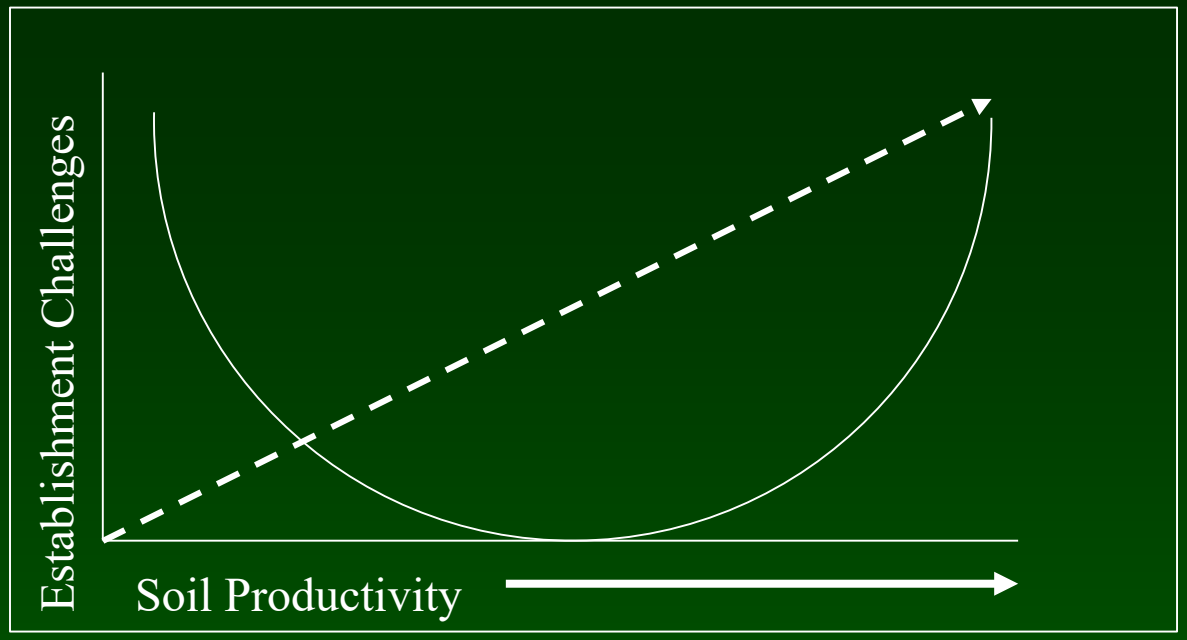


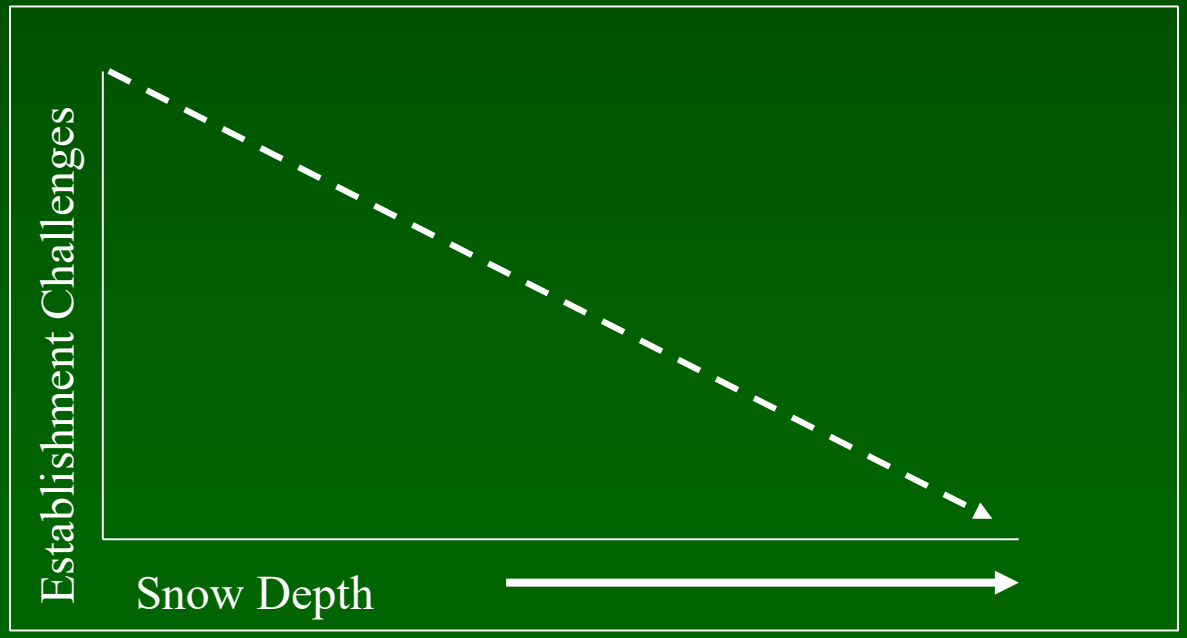
3 side release



10-year Diameter Growth in Inches for 20 Best Crop Trees/Acre in 54 Year-Old Stand



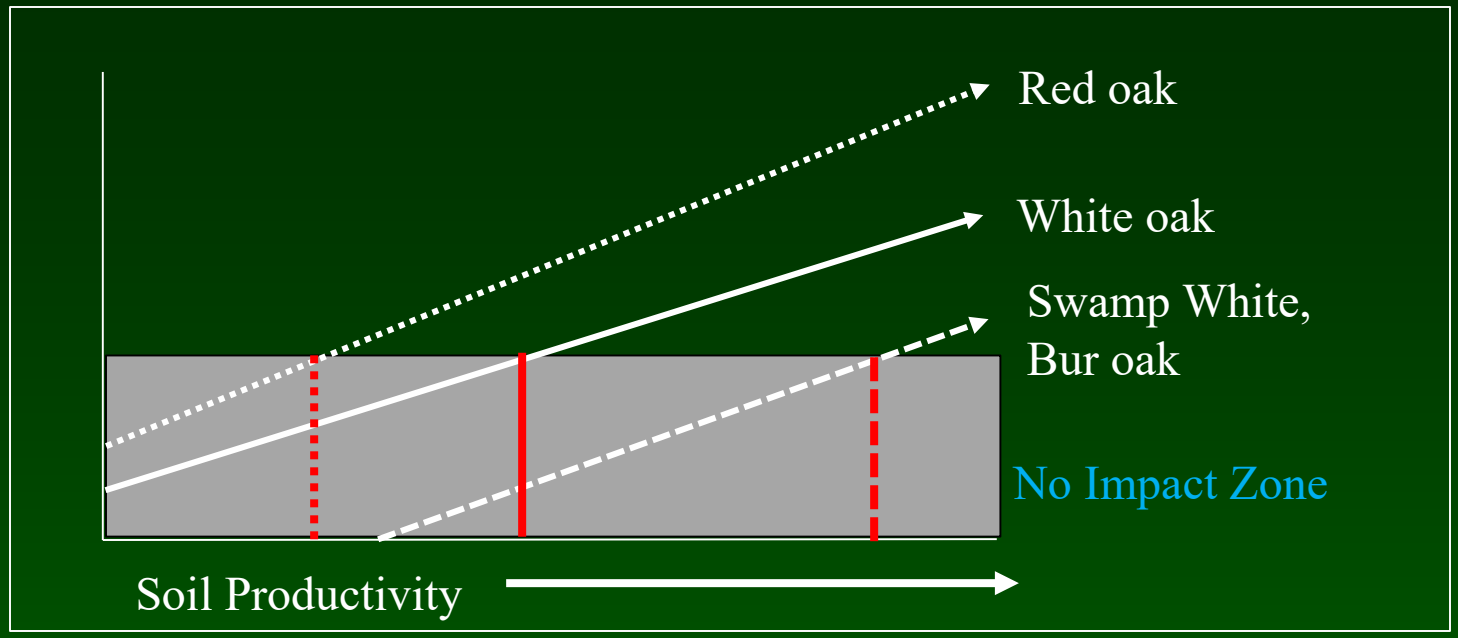




General assumptions for this talk

Establishment Challenges

- Competition
  - Water and Nutrients
- Browsing by deer
- Silvicultural Legacy


Red oak
White oak
Swamp White,
Bur oak
No Impact Zone
Soil Productivity

- Hard Mast Species – Deer Browse Preference
  - Red, white, swamp, bur oak,
    hickory, walnut
- Location – Proximity to deer complex
  - Distance to thermal cover
  - Distance to food source (non-tree)
    - Soybeans, corn, hay
  - Local farming practices (No Till vs conventional Till
- Snowfall Zone – Forced migration shifts time of damage and control options
- Soils
  - More Productive = spring/early summer damage
  - Less Productive = slower growing can shift damage to fall winter buds
- Funds available – it costs to protect