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PREPARING A NEW GENERATION
OF ILLINOIS FRUIT AND VEGETABLE FARMERS

BASIC FRUIT PRODUCTION

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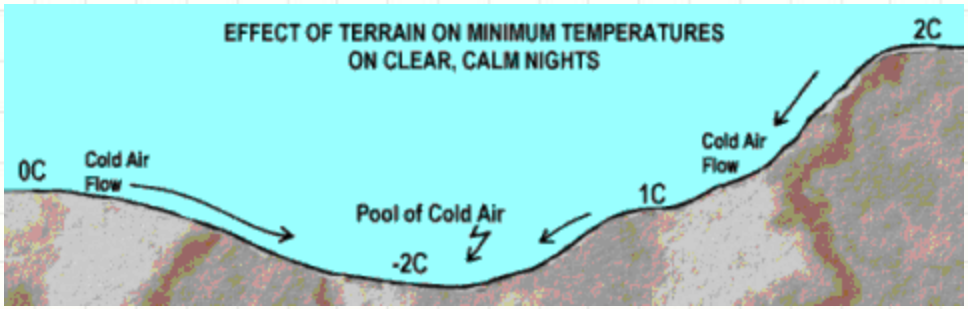
Today's objectives

- Understand at a basic level …
  - Site selection, variety and rootstock selection, planting and training
  - Know that annual pruning is always necessary
  - Know that annual thinning of tree fruits is almost always necessary



Most perennial fruits are not suited to low areas or poorly drained areas.

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Fruit plantings are a long term investment

- Before you begin
  - Invest considerable effort into site selection
  - Soil preparation
  - and planting plans
- Before you order plants
  - Learn about pollination needs
  - Winter hardiness
  - Susceptibility to pests

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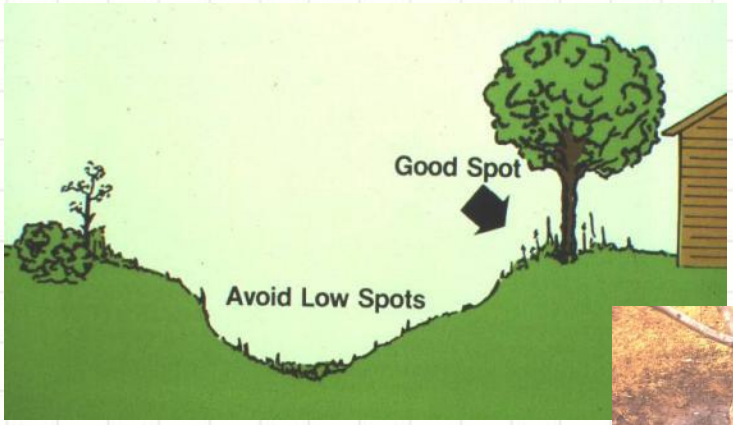
The optimal planting site

- Full sunlight
- Clean site (good weed control)
- Good water and air drainage
  - Avoid frost pockets
- Friable, fertile soil
- Windbreak
- Ready water supply



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Preplant soil recommendations

- Begin soil preparation at least 1 year in advance of planting
- Address drainage issues (fruit plants “hate” wet feet)
  - Tiling, terracing, ridges
- Perform soil test and make appropriate adjustments
  - *p*H, Nitrogen(N), Phosphorus(P), Potassium(K) and organic matter (OM) most critical
    - Tissue analysis used after crop establishment
- Clear site of weeds, particularly problematic perennial weeds

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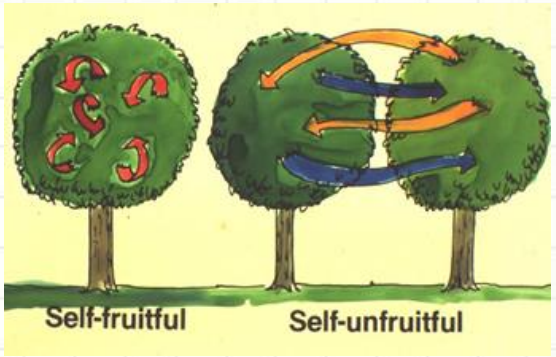
“General” Fruit Pollination Requirements



- Self-fruitful
  - Peaches, nectarines, European plums/prunes, apricots, tart cherries, currants, gooseberries, grapes, raspberries, blackberries, blueberries and strawberries
- Self-unfruitful
  - Apples, pears, most Japanese plums, elderberries and most sweet cherries

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Examples of "not the norm"

- Partially to fully self-fruitful apples
  - Braeburn, Golden Delicious, Granny Smith, Red Rome
- Pollen sterile apples
  - Baldwin, Creston, Gravenstein, Jonagold, Boskoop, Mutsu, Crispin, Rhode Island Greening, Roxbury Russet, Shizuka, Spigold, Stayman, Bramley's Seedling, Wealthy and Winesap
    - If you plant one of these, you need to plant two more cultivars

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Pollinators

- Examples of fruit that rely on insects to carry pollen
  - Strawberries, blueberries, apples, plums and sweet cherries
- Examples of fruit that rely on gravity and wind to carry pollen
  - Peaches and grapes

Commercial bee hives brought in to pollinate a commercial apple crop

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Vertebrate pest control

One growers solution to deer feeding on young fruit trees

Mouse girdled apple tree

- Main pests
  - Deer
  - Voles and mice
  - Birds

Applying nets for bird control in grapes

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Irrigation

- Most often needed
  - Dwarf apple
  - Brambles
  - Strawberries
    - Frost protection
  - Blueberries

Solid set risers for frost protection in strawberries

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Staked and or trellised

- Dwarf and semi-dwarf apples
- Grapes
- Semi-erect blackberries

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Selecting cultivars

‘Honeoye’-main crop, large, taste good, powdery mildew resistant

‘Early Glow’-early, small, taste GREAT, powdery mildew susceptible

- Marketability
- Harvest window
- Taste
- Shipping quality
- Adapted to planting site
- Susceptibility to pests
- Ease/difficulty of production
- Cost of production
- Time commitment

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Focus on Tree Fruit

- Potential to lose a crop due to early season cold temperature
  - Most
    - Apricot
    - Sweet cherry
  - Very
    - Peaches
    - Nectarines
  - Moderately
    - Plum
    - Pear
    - Sour cherry
  - Least
    - Apple

Apple bloom kill from late-season frost

Frost ring (damage) on apple and pear

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Rootstock selection

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Apple rootstocks

- Woolly Apple Aphid Resistance
- Fire Blight Resistance
- Replant Disease Complex Resistance
- Crown and Root Rots (Phytophthora)
- Cold Hardiness
- Productivity/Yield Efficiency
- Low suckering and burr knots
- Nursery friendly

Example of an apple rootstock that suckers

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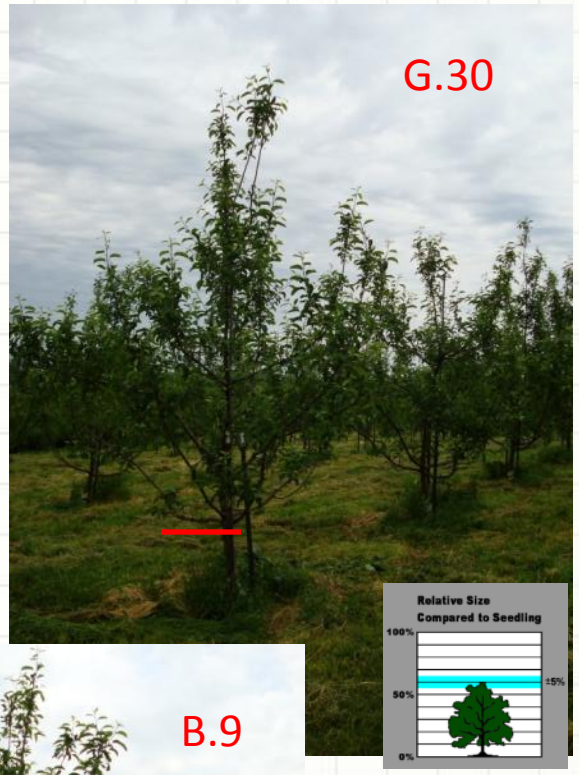
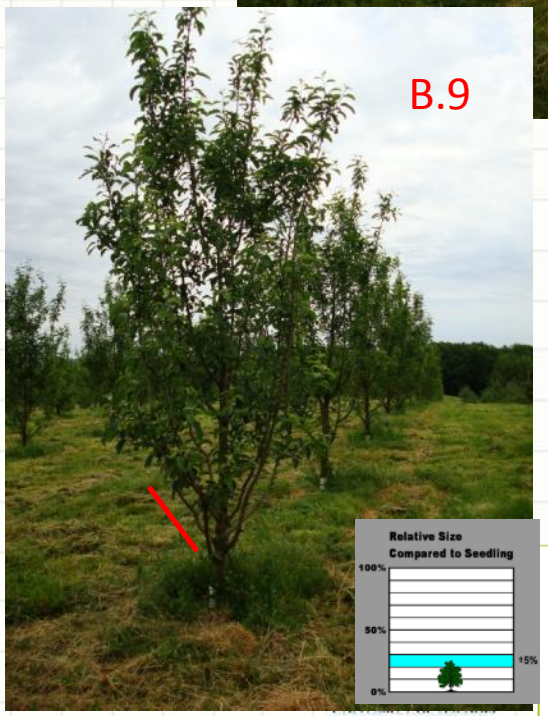
Most Common Apple US Rootstocks (% of seedling)

- Dwarf (Requires support, except maybe M.26
  - B.9 (20%)
  - M.9 (30%) several clones
  - M.26 (35-50%)
- Semi Dwarf (may need support)
  - M.7 (60%)
- Semi Standard (free standing)
  - M.106 (70%)
  - M.111 (70%)





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Peach Rootstocks

- Seedling (12-15') (in order of increasing cold hardiness—only an issue if production is marginal)
  - Halford
  - Lovell
  - Tennessee Natural
  - Bailey

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Nursery stock

- Buy high quality
  - Reliable nursery
  - Most common
    - ½” diameter
    - Bare-root (dormant)
    - One-year-old whips (single stem)
      - Two-year-old feathered tree (several branches)

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Feathered and whip trees

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When trees arrive from the nursery

- New dormant trees must not have open buds
- Must be kept moist at all times
- If trees cannot be planted due to weather, they must be kept in cold storage at 32 to 35 degrees F or placed in a box and covered with sawdust and kept in an unheated cellar.
- Trees must not be stored with fruits or vegetables that produce ethylene

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Tree planting with hand or augur

- Soak roots in water and cut any damaged roots
- Place the tree in the center of the hole and fill hole with top soil
- Graft union must be 2 to 3 inches above the soil surface
  - Otherwise, dwarfing effect is lost if scion roots
  - The higher the graft union above the soil surface the smaller the tree will be

Other options for planting new trees

- Tree planter
  - Used when planting large number of tree
- Tree augur
  - Used in small size orchards

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Purpose of training and pruning

- Training directs tree growth into a desired shape and form to establish a specific structure.
- Training young fruit trees is essential for proper tree and fruit development. It is more economical to direct tree growth with training than to correct it with pruning.
- Pruning is the selective removal of a portion of a tree to correct or maintain tree structure.

Types of tree training

- Central Leader
- Open Center
- Vertical Axe
- Tall Spindle
- Super Spindle
- Palmette
- Espalier
- Tatura

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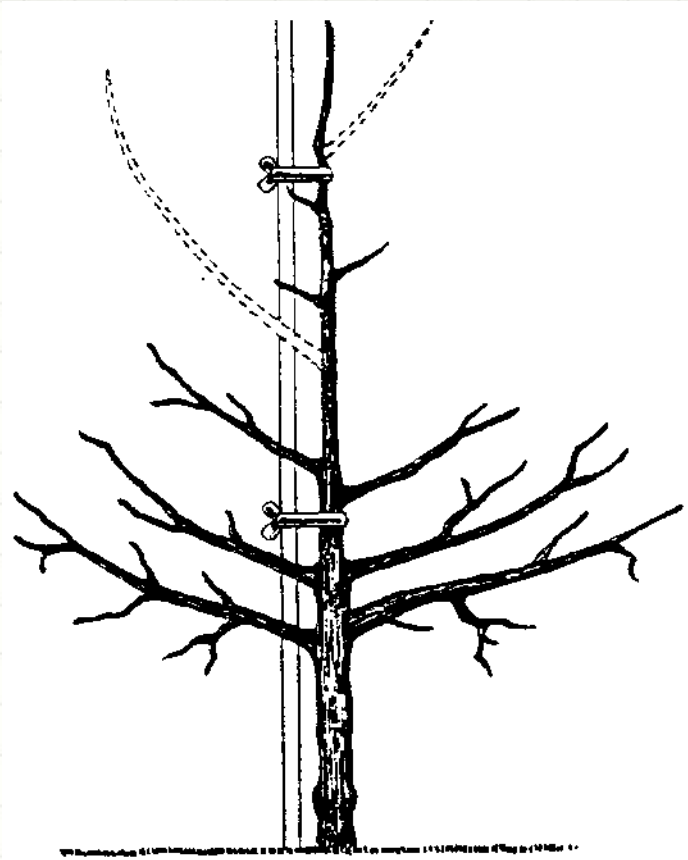
Training Systems for Fruit Trees

- Central Leader
  - One main trunk is 5-8’ high
  - Lowest branch 18-22” from the ground
  - 4-7 scaffold branches, 4-8” apart vertically
  - 40-90^{o} crotch angles



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Training trees to a central leader at planting

- Head un-branched new trees at about 30 inches above ground or 8 to 12 inches above the top good lateral branch
- In cultivars that tend to grow vertical branches, use spreaders to increase the branch angles in order to slow shoot growth and strengthen the branch angle.
- Remove broken or downward branches and leave a small stub to allow for new bud growth at that site if desired. This cut is called a Dutch cut.

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Training Systems for Fruit Trees

- Open Center
  - A single trunk 18-30” high
  - 2-5 scaffold branches close together vertically
  - Preferably, no branches facing southwest
  - Crotch angles 40-90^{o}

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Peaches and nectarines: Open center training and pruning

- *At Planting*
  - If tree is un-branched (whip), head the leader at between 26 to 30 inches above ground when the buds start to swell in early spring.
  - If the tree has branches, select 3 or 4 branches located 15 to 30 " above the soil line, preferably one at each compass point.
    - Cut back by ½ to an outward facing bud
    - Remove all branches less than 15" above the soil line and cut the tree off just above the topmost selected scaffold

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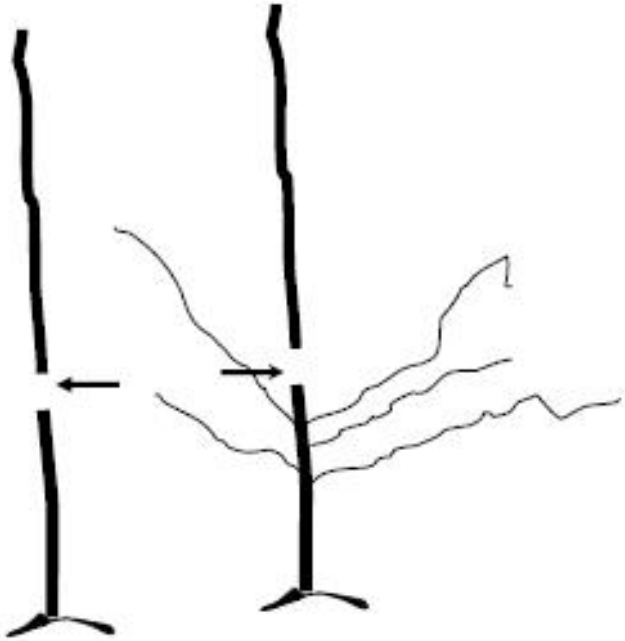
The Open Center Training System



At planting

Top View

Sketch
Of Top View

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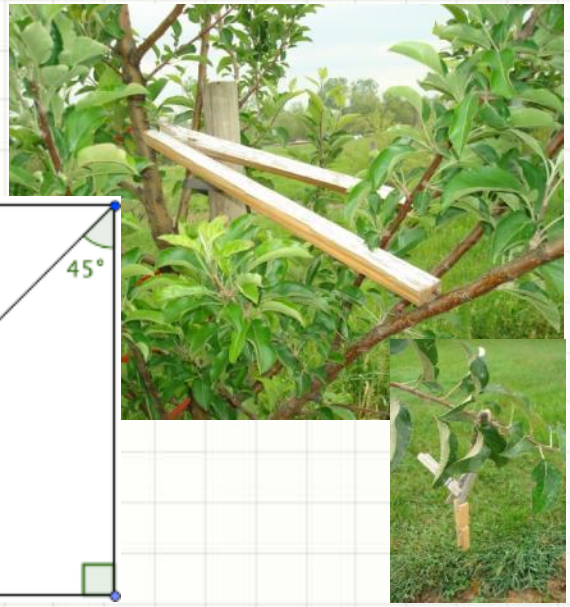
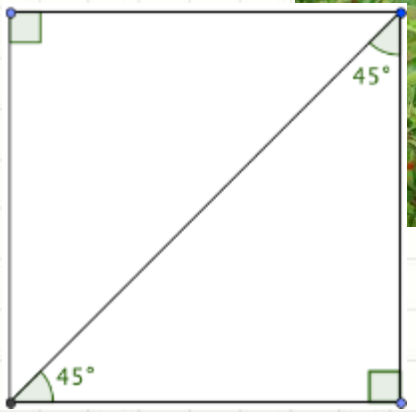
Care of Young Trees





- Remove grass and weed competition
  - 2-3’ out from base of tree
- Prevent premature bearing
  - Remove fruit first two growing seasons
- Use limb spreaders to hasten bearing (apple)
  - 45^{o} branch angle
- Protect from pests

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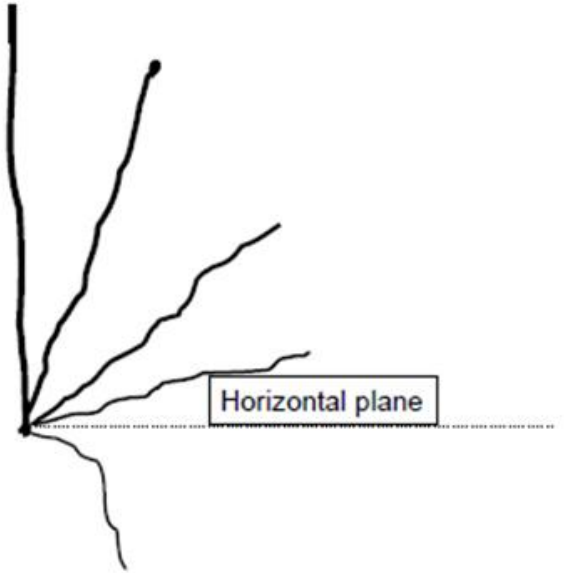
Branch Angle Effect on Vigor

- The more vertical the shoot, the more vigorous it is
- Vertical shoots also have stronger buds
- Shoots growing below the horizontal plane are the weakest



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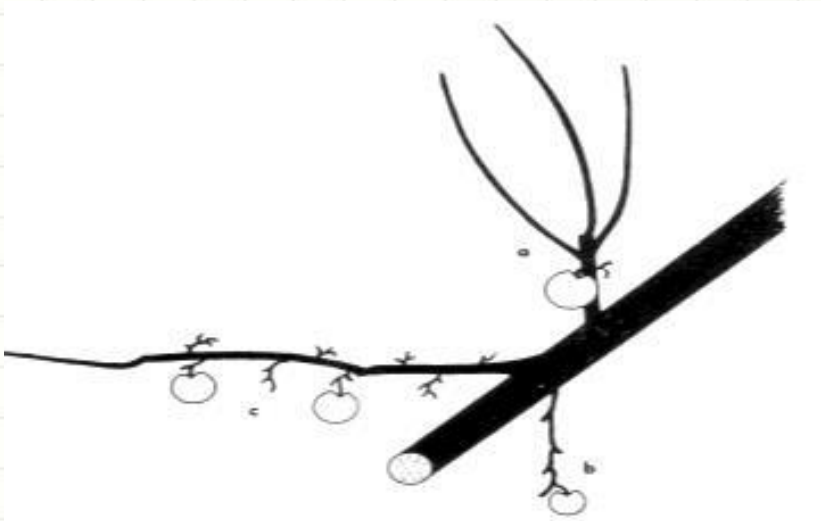
Branch angle's effect on fruit formation

- Branch angle affects fruit number and fruit size
- Vertical branches have very few larger fruits
- Horizontal branches have more fruits of moderate size
- Below horizontal branches have less fruits of smaller size



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Annual Pruning

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Flower Habits

- Apple
  - Usually borne terminally on shoots or short spurs
    - Contain 5 (or sometimes 6) flowers
      - Center blossom opens first (determinate)

- Peach
  - Solitary flowers from axillary buds of last year's growth
    - So 15-20" of new growth each year are needed to maintain good cropping

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Apple buds

- Leaf buds, fruit spurs, fruit buds and bloom

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Peach buds

- Flower buds are borne on 1-year old wood
  - Pictured here
    - Center bud is a leaf bud
    - The large bud on either side is a flower bud

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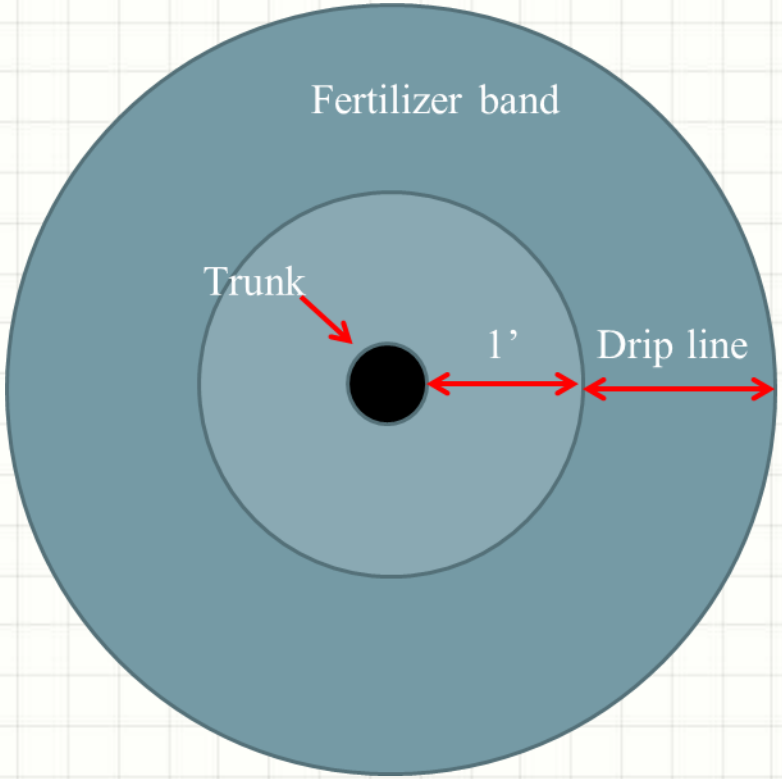
Nutritional Requirements



Thinning

- To increase fruit size
- To obtain annual production
- To improve fruit quality
- To avoid tree breakage

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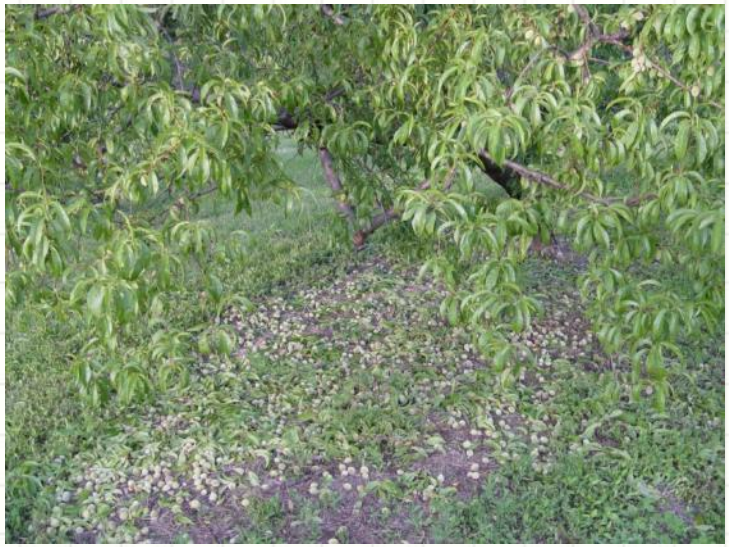
Methods of Thinning

- Hand thinning
- Mechanical removal (peach only)
  - Rope, string, club
- Chemical (apple only)



Bloom thinning peach

- Ropes
- Strings

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Chemical thinning of apples

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Publications

Apple Thinning Guide

by Philip Schwallier

Available from:

Great American Media Services
343 South Union Street
Sparta, MI 49345

$12.00 (includes shipping)

To order, contact Kim Meyers at 616-887-9008 or kmeyers@greatamericanpublkush.com

Pennsylvania Tree Fruit Production Guide

Available from:

Publications Distribution Center
College of Agricultural Sciences
The Pennsylvania State University
112 Agricultural Administration Building
University Park, PA 16802-2602
Phone: 877-345-0691
E-mail: AgPubsDist@psu.edu

Hard Copy: $35.00 + shipping
Electronic (PDF) Version: $30.00

Further details: http://tfpg.cas.psu.edu/

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Thinning Materials

- Lime sulfur (organic)
- NAD (Amid-thin® W)
- NAA (K-Salt™ Fruit Fix™ 200)
- 6-BA (MaxCel®)
- Carbaryl (Sevin® XLR Plus)
- Ethephon (Ethrel®)

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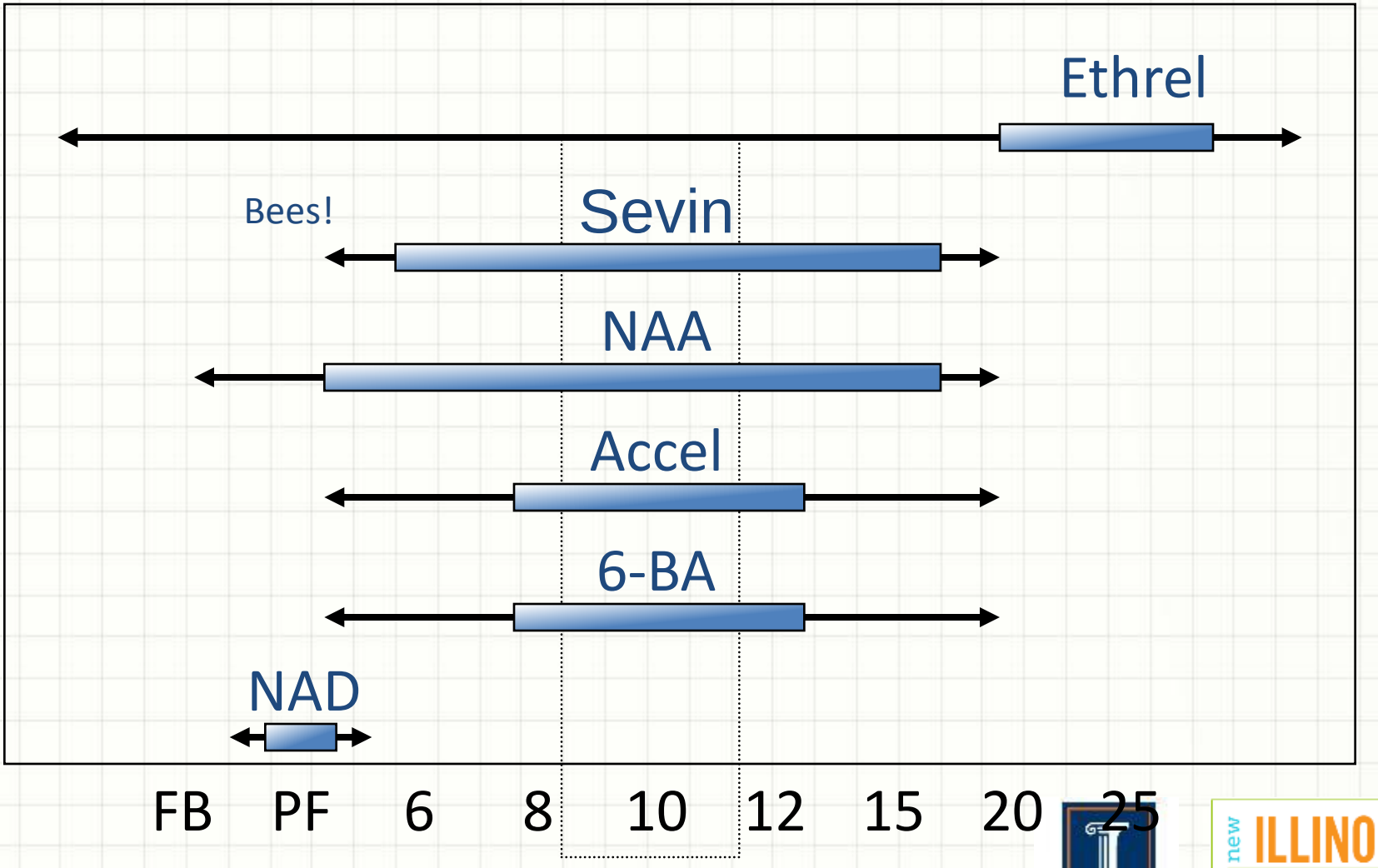
Timing of Materials



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Fruit Tree Pests

- Where?
  - Trunk
  - Roots
  - Leaves
  - Flowers
  - Fruit

Resources

- http://www.wvagriculture.org/images/Literature/How_to_Prune_Young_and_Bearing_Apple_Trees.pdf
- http://pubs.ext.vt.edu/422/422-020/422-020_pdf.pdf
- http://www.extension.org/blueberries
- http://www.extension.org/grapes
- YouTube video - Pruning a Mature Peach Tree
- YouTube video - Pruning Apple Trees

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