



UNIVERSITY OF ILLINOIS
EXTENSION

Illinois Migrant Council

PREPARING A NEW GENERATION OF ILLINOIS FRUIT AND VEGETABLE FARMERS

a USDA NIFA BEGINNING FARMER AND RANCHER
DEVELOPMENT PROGRAM PROJECT
GRANT # 2012-49400-19565

<http://www.newillinoisfarmers.org>





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**PREPARING A NEW GENERATION
OF ILLINOIS FRUIT AND VEGETABLE FARMERS**

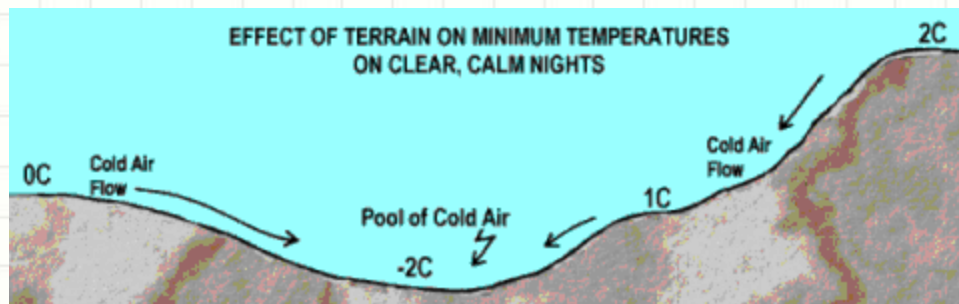
BASIC FRUIT PRODUCTION

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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.

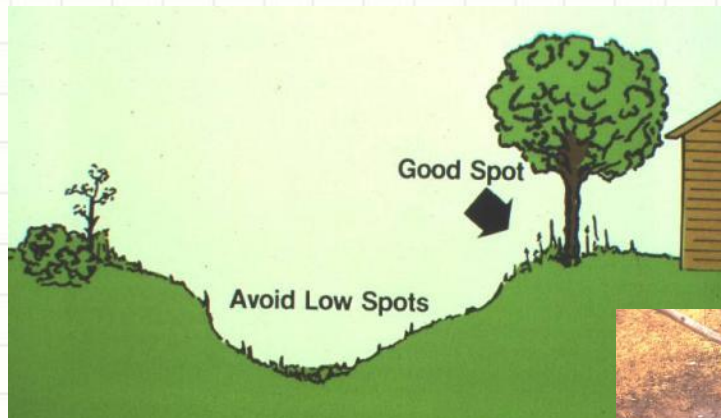
Fruit plantings are a long term investment

- 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



The optimal planting site

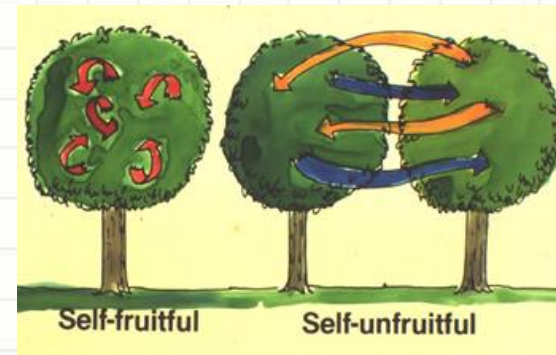
- Full sunlight
- Clean site (good weed control)
- Good water and air drainage
 - Avoid frost pockets
- Friable, fertile soil
- Windbreak
- Ready water supply



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
 - pH, 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

“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

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



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

Vertebrate pest control

One grower's solution to deer feeding on young fruit trees



Applying nets for bird control in grapes



Mouse girdled apple tree



- Main pests
 - Deer
 - Voles and mice
 - Birds

Irrigation

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



Solid set risers for
frost protection
in strawberries

Staked and or trellised

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



Trellised high density apples



Trellised grapes



Blackberries on a movable trellis

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

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



Rootstock selection



Apple rootstocks

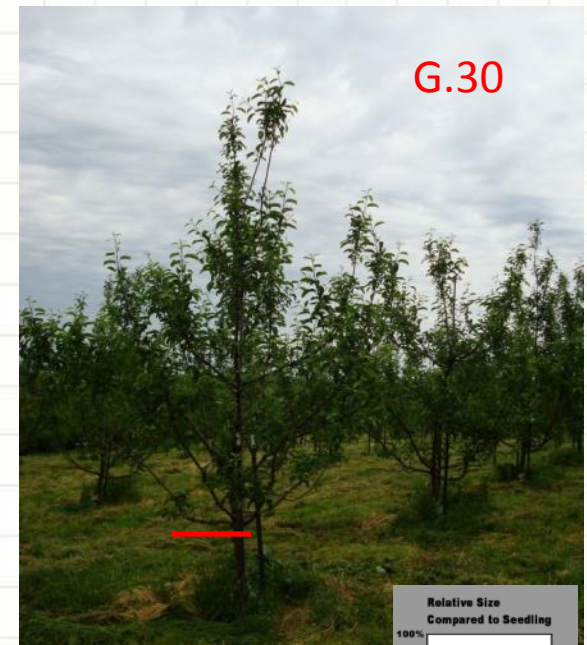
- Woolly Apple Aphid Resistance
- Fire Blight Resistance
- Replant Disease Complex Resistance
- Crown and Root Rots (Phytophthora)
- Cold Hardiness
- Productivity/Yield Efficiency
- Low suckering and burr knots
- Nursery friendly



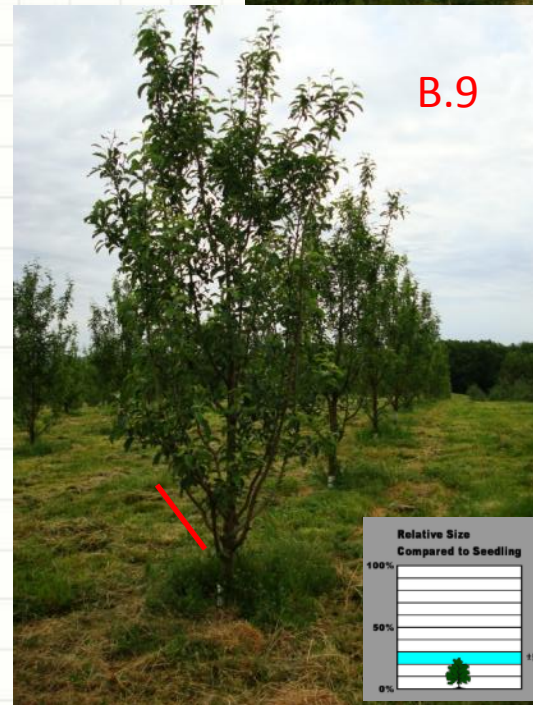
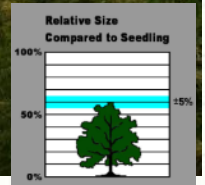
Example of an apple rootstock that suckers

Most Common Apple US Rootstocks (% of seedling)

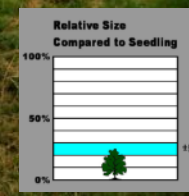
- Dwarf (Requires support, except maybe M.26)
 - B.9 (20%)
 - M.9 (30%) several clones
 - M.26 (35-50%)
- Semi Dwarf (may need support)
 - M.7 (60%)
- Semi Standard (free standing)
 - M.106 (70%)
 - M.111 (70%)



G.30



B.9



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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





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)

Feathered and whip trees



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



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



Purpose of training and pruning

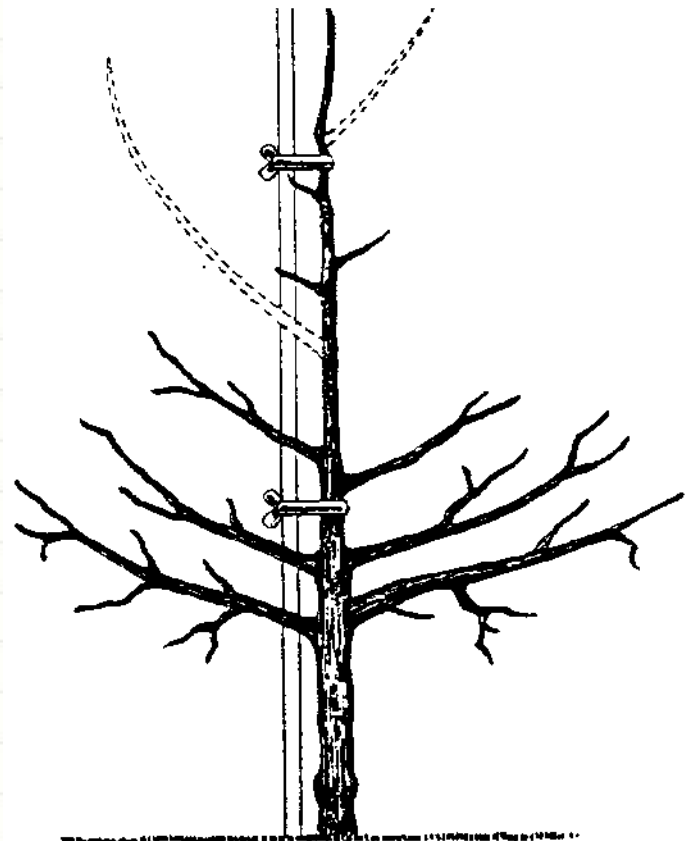
- Training directs tree growth into a desired shape and form to establish a specific structure.
- Training young fruit trees is essential for proper tree and fruit development. It is more economical to direct tree growth with training than to correct it with pruning.
- Pruning is the selective removal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

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° crotch angles



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.

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°

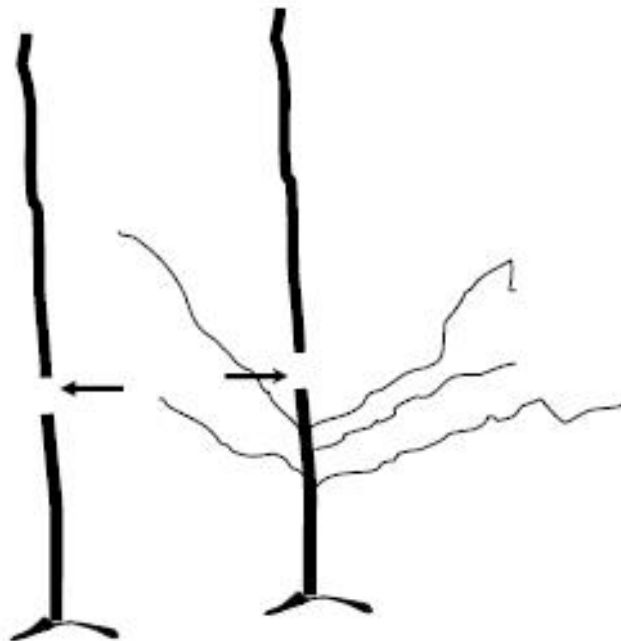


Peaches and nectarines: Open center training and pruning

- *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

The Open Center Training System



At planting



Top View



Sketch
Of Top View



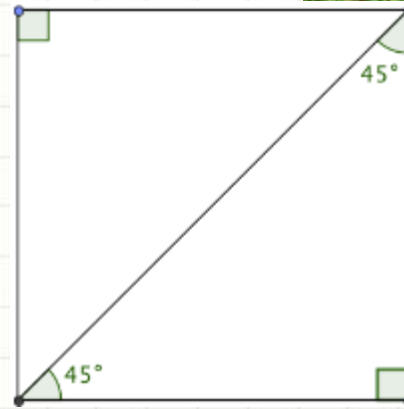
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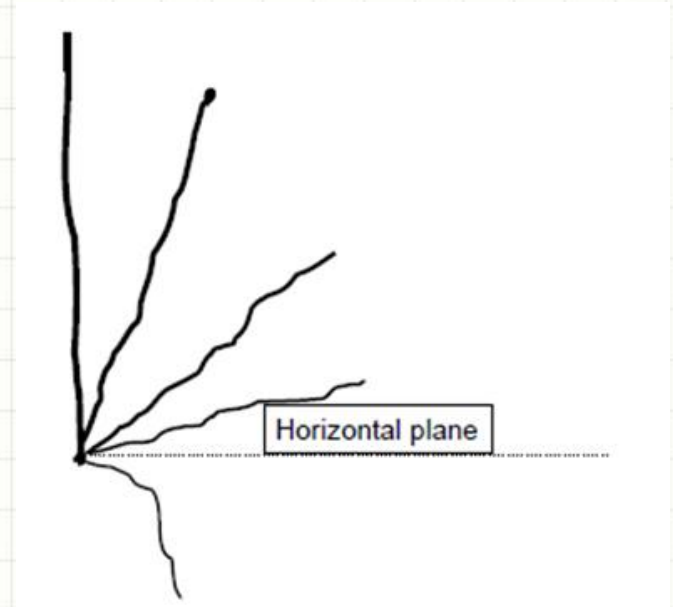
Care of Young Trees

- 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° branch angle
- Protect from pests



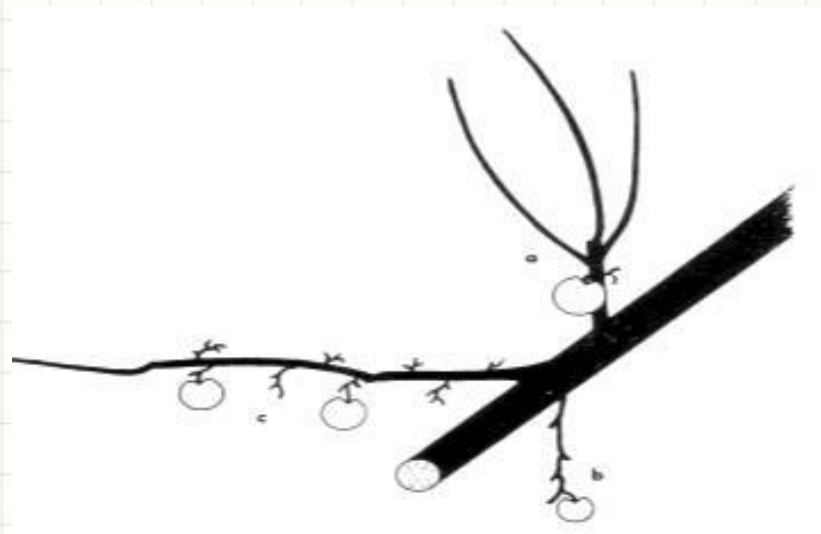
Branch Angle Effect on Vigor

- 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

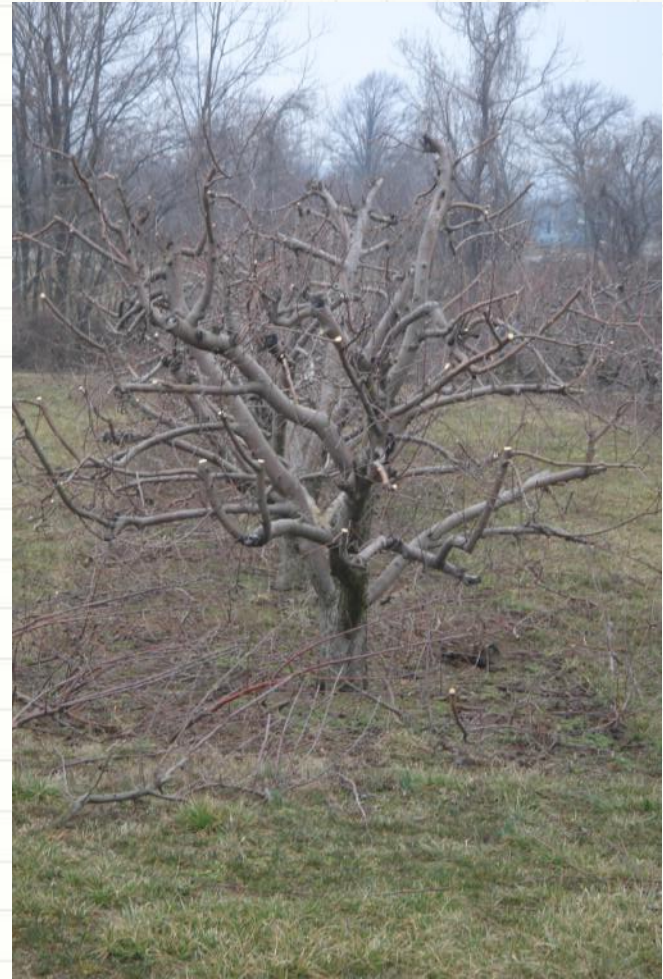


Branch angle's effect on fruit formation

- 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



Annual Pruning



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



Apple buds

- Leaf buds, fruit spurs, fruit buds and bloom

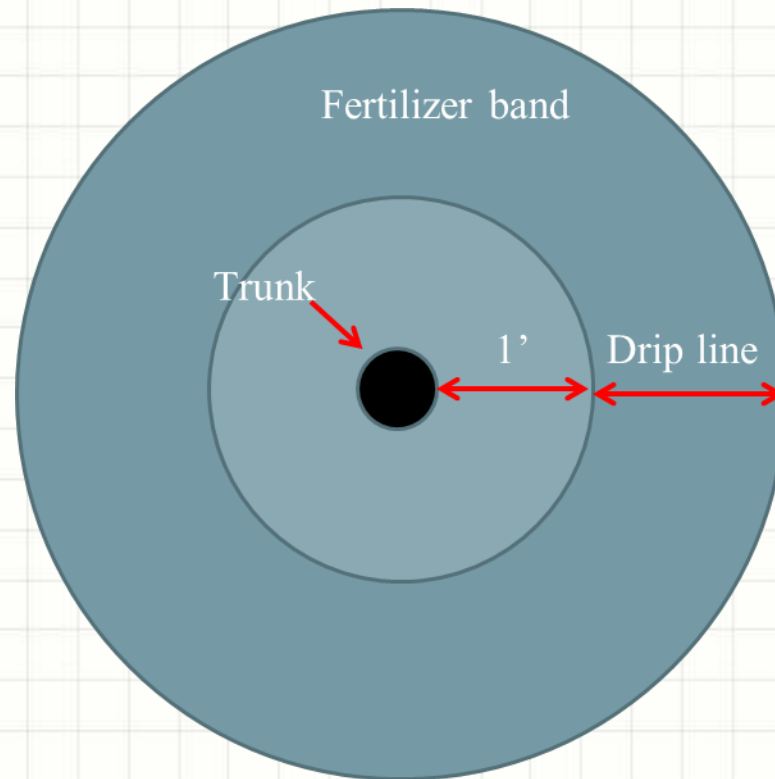


Peach buds

- 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



Nutritional Requirements



Thinning

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



Methods of Thinning

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



Bloom thinning peach

- Ropes
- Strings



Chemical thinning of apples



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

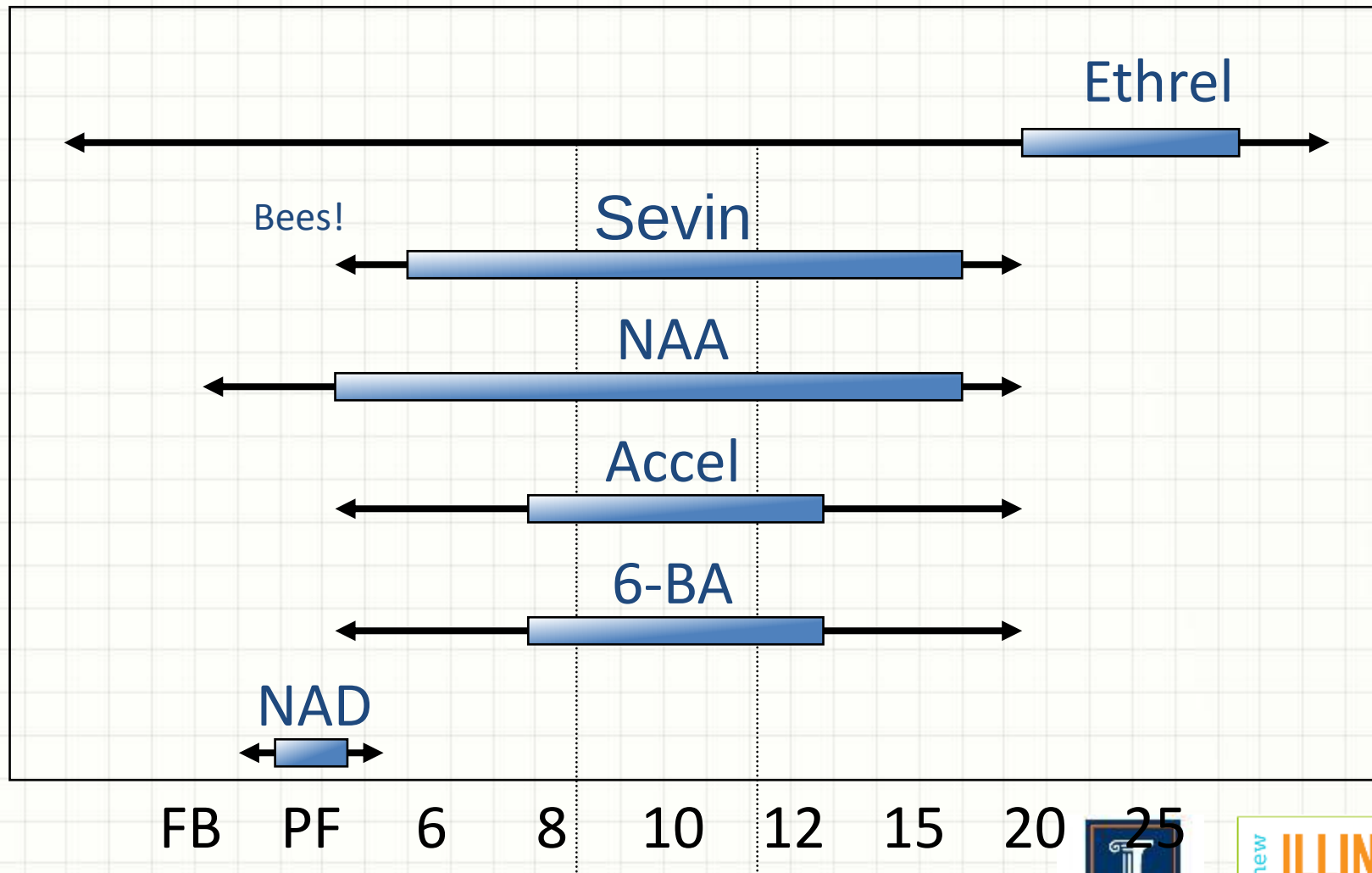
Further details: <http://tfpg.cas.psu.edu/>



Thinning Materials

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

Timing of Materials



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](#)

To reach us

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If you have questions ...

- University of Illinois Extension Local Food Systems and Small Farms team
 - <http://web.extension.illinois.edu/smallfarm/>
- USDA's Start2Farm site
 - <http://www.start2farm.gov/>