Pruning and Caring for Apple Trees
From heritage treasures to the best new cultivars—
A guide to the culture, character and history of apples.

Warren Manhart

Apples for the 21st century
Pruning Objectives

- To train a plant
- To maintain plant health
- To improve quality of flowers, fruit, foliage and stems
- To control growth
Two Interrelated Processes

1. Sunlight and carbohydrate physiology

2. Plant hormone physiology (plant growth regulators)
1. Fruit Trees Require Sunlight !!!

- Leaves require 30-50%
- Fruit need >70%

Fiesta Apple
Prevent Heavy Shading

- Site selection
- Tree spacing
- Proper limb positioning
- Pruning (dormant & Summer)
Trees Love Sunshine

Eatable landscape
Apple Blossom
State Flower: *Arkansas & Michigan*

Sekai-Ichi
Bees Love Sunshine

Mason Bee on plum
Everybody Loves The Sun

Summer Bellflower
Prune For Fruit Quality

- Increase Light
- Better Pollination
- Reduce over cropping
- Disease & pest Control

Frost peach
“What Makes An Apple Taste Good”  
(Soluble Solids – Sugars)

- **Lower** in fruit from over-cropped trees.
- **Higher** in well thinned crops.
- **Higher** in fruit taken from sunny parts of tree.
- **Higher** from trees with healthy foliage.
Apple Scab
Anthracnose Canker

“bull’s-eye-rot”
(when on fruit)

[A fungus]
Anthracnose Limb Canker
2. Plant Growth Regulators (Hormones)

- Auxins
- Cytokinins
- Gibberellins
- Ethylene
Auxins (Produced in vertical growing tips)

- Strong apical dominance
- Moves under gravity to roots
- Stimulates vertical growth
- Restricts lateral shoots
- Controlled by pruning and limb bending
Cytokinins

- Produced in roots
- Important in cell division and growth
- Stimulates growth of laterals after Auxins have been reduced
Gibberellins

- Produced in seeds and expanding leaves
- Functional in fruit cell expansion & rate of growth
- Can inhibit flower buds and cause bi-annual fruiting
Ethylene

- Gaseous hormone
- Released after injury
- Accelerates healing (timing of heavy pruning)
- Used to ripen fruit
Five Elements of Early Training & Care

1. Select rootstock
2. Variety selection
3. Proper planting
4. Early pruning
5. Limb bending [training]
1. Rootstock (critical)

- Adaptability to soils
- Early fruiting
- Help control tree size

- *Standard trees are most hardy and vigorous*
2. Variety Selection

- Individual growth habit
- Differing fruit bearing pattern
- Ultimate tree size
- Chill Hours Required
How Big Will My Tree Grow?

APPLE TREE APPROXIMATE HEIGHT & SPACING CHART

Centennial
Akane
Bramley

Corail
Pristine
Greensleeves
Beni Shogun
Dayton
Queen Cox
Freyburg
Spartan

Wms Pride
Evereste
Honey Crisp
Fiesta
Dolgo Crab
WSU AxP

Gold Star
Belmac
King
Liberty
Shay
Wolf River

Melrose
Rubinette
Rebella
Karmijn
Ashmead’s
Shizuka

Chehalis
Boskoop
Gravenstein
Enterprise
Foxwhelp
Jonagold

EMLA 27
4 feet
5 feet
6 feet
11 feet
16 feet
Antanovka

EMLA 26
8 feet
10 feet
12 feet
11 feet
16 feet

EMLA 7, MM 106
14 feet
14 feet
18 feet
20 feet
30 feet

25 feet
35 feet
Chill Requirement

# of hrs. between 32 - 45 degrees F
<table>
<thead>
<tr>
<th>Fruit</th>
<th>Chill Hours</th>
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<tbody>
<tr>
<td>Apple</td>
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<td>E. Pear</td>
<td>600-800</td>
</tr>
<tr>
<td>A. Pear</td>
<td>400-500</td>
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<tr>
<td>Fig</td>
<td>100-200</td>
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<tr>
<td>E. Plum</td>
<td>800-900</td>
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<td>J. Plum</td>
<td>300-500</td>
</tr>
<tr>
<td>Peach</td>
<td>600-800</td>
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<tr>
<td>Persimmon</td>
<td>200-400</td>
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<td>Kiwi</td>
<td>600-800</td>
</tr>
<tr>
<td>Citrus</td>
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</table>
3. Planting

- Warm sunny site
- Adequate hole
- Tree position in hole
- Watering-in
- Support
Support Young Tree
Serpent Tree
(Apple trees go walking)
Eye of the Dragon
Permanent Support
4. Early Pruning

- Light Pruning
- Remove damaged wood
- Remove undesirable wood
- Select strong scaffold limbs
- Good angles and spacing
- Head at 3-4 ft. to stimulate branching as needed
Notching:

- Remove a piece of bark to produce a limb where needed.

- Notching above a lateral bud in early spring prevents auxin from reaching the lateral bud, resulting in a limb.
Vase-like Form
Pyramid Form
Vase-like Form

Spartan apple
Limb Pattern
Four Main Limbs

With vertical separation
Tight Limb Cluster
Five Can Get Crowded
Three are Okay
Limb Angle

![Diagram showing 60° angle]
5. Limb Bending and Positioning

- 45-60 degree limb angles (3-5 well spaced)
- Apical dominance is reduced
- Limb elongation is reduced
- Lateral branching is increased
- Branches are stiffened
- Flower density is increased
Limb Bending
Tie-Down

Bowline Knot
Limb Spreading
Branch Replacement

2-year old upright shoot tied down to 60 degrees for replacement branch.
Limb Bending

Sometimes a heavy fruit load can be used to lower growing tips
Good Angles & Spacing
Narrow Weak Angle
Advanced Decay
Weepy Branch

Weepy branch
Types of Pruning Cuts

- Heading
- Thinning

Not safe for pruning
Definition: Limb v. Branch

- **Limb** – entire appendage all the way back to the main trunk

- **Branch** – Intermediate appendages attached to a limb or to other branches.
1. Heading Cuts

- Control height or Size
- Most invigorating type of cut
- Reduce apical dominance
- Stimulates new shoots
- Stiffens the branches

*Useful to induce branching at specific points (especially in young trees)*
Heading of Young Tree
Heading Older Tree
2. Thinning Cuts

- Thin for light penetration, fruit quality and keep bearing wood young.
- A tree maintenance function
  - Removes undesired wood
  - Shorten limbs
  - Control amount of growth
  - Directs growth
  - Reduce total amount of fruiting wood
Types of Thinning Cuts

- Removal of entire limb to main trunk
- Shorten limb or branch back to a lateral branch or vigorous bud
- Remove strong upright water sprouts or shoots
PNW
400
Pollination

Apples are:
Genetically diverse
Parts of a Flower
Apple Pollination Chart

To Grow Apples You Need Proper Pollination

Variety Pollinated

<table>
<thead>
<tr>
<th>Variety Pollinated</th>
<th>Early Pollen</th>
<th>Mid-Spring Pollen</th>
<th>Late Pollen</th>
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4/5/2011 Loyd Collett, Easter Valley Ranch
Apple Truisms

- Fertilization is necessary to produce seeds. (individually)
- Fruit rarely develop without seeds.
- Most apples have 5-10 seeds.
- With < 3 seeds, an apple will usually drop.
- Misshapen or lopsided fruit indicate inadequate pollination.
- More seeds = larger the fruit.
- Rain, wind, cool weather can inhibit pollination.
- >55 degree weather okay -- with enough bees.
- Mason Bees will be active sooner than Honey Bees.
- Only 2-8 % of apple blossoms need pollination to set full load of fruit.
Apple Blossom

King blossom
Pear Blossoms
Plum Flowers
Thinning Fruit

- Improve size and quality

- Early is better than later
  - Ultimate fruit size is greater
  - Promotes fruit bud development for next year
  - Helps prevent bi-annual fruiting
Nutrient Sink Interactions

- Vegetative sinks
  - Roots, stems, leaves

- Fruit are major sinks

Balance vegetative growth and fruit load (pruning & thinning)
Fruit are Nutrient Sinks

Liberty apple
When Should I Prune?
When Should I prune?

**ANYTIME PRUNING**

- Remove dead, damaged, diseased
- Crowded, weak, low vigor
- Interfering, wrong way, and bottom branches.
- Unwanted suckers.
When Should I Prune

- DORMANT PRUNING
  - Best time for heavy pruning
  - Clear view without leaves
  - Just Before bud swell is best
  - Quicker start for healing
  - Less overall stress
  - Greatest growth response
  - Best for restoration of old trees
Old Tree Restored
Happy is He

Homestead apple
Strong Branches
Same Apple Tree
Restored by Heading & Grafting

Top-Worked to Liberty
Bark Grafts on Large Branch Stubs
Two Restored Apple Trees with Electric Elk Fence Protection
Restored Gravenstein
Aggressive Action Required
Restored Yellow Transparent
100 Year Old
Homestead Apple Tree
(Too fragile to restore)
Death Defying

Granddad’s old apple
Restorable

What Say You

❓❓❓
The Planter

(Elderberry)
Bad News
What Now ?????
Stimulated Growth
Before and After
Pruning to restore an old, neglected apple tree

R.L. Stebbins

This neglected apple tree is 24 feet tall and has a spread of 24 feet (only half is shown). Because the trunk is fairly solid and the tree is basically healthy, it can be restored. Careful pruning over a period of years will be required to:

- reduce its height,
- increase the vigor of fruiting wood, and
- open the tree to light and make it accessible for spraying and picking.

If you tried to do it all at once—the heavy cutting to reduce tree height—you’d produce excessive and unmanageable regrowth in the remaining limbs. It’s better to take it in stages.

The five basic pruning stages, or steps, are outlined on the following pages. Whether or not you have a particular apple tree in mind, follow the steps as though you were doing the pruning yourself.

Robert L. Stebbins, Extension horticulturist, Oregon State University.
Before and After
Before Pruning

King apple
After Pruning

Thinning cuts
When Should I Prune?

- **SUMMER PRUNING**
  - For reduced growth response
  - Top removal in small trees
  - Remove small unwanted shoots
  - Remove water sprouts when six inches and longer
When Not Removed
Getting Started

- You know what you want
- But how to get there???
A. Start with the obvious
B. Decide how high
C. Remove big wood early
D. Wander and ponder
E. When is enough???
Pruning Technique

**Correct**
45-degree angle

**Incorrect**
Too angular
Too low
Too high
Healing Process

Callus growth
Large Wound

Grafted stump
Delayed Healing
Water Hole
Dental Work
Large Wounds
Limb Fractures
Limb Fracture
Fracture Repair
Fracture Repair
Healing Over
Complete Blowout
Preventing Fractures

- Prune
- Thin
- Prop

*Prop as a last resort, and only after the first two fail.*
To Remove Large Limb

First cut
Second cut
Final cut
Rip-Tear
Preserve Limb Collar

Collar
Zero Ground Clearance

Freedom apple
Ground Clearance

Lawn mower high
Orchard Mason Bees
will sneak up and over the edge to collect nectar
Active Bee Block
Rewards Day

Liz Olsen Photo
Art by
Carol DeMuth
Toledo, OR