Persimmons

An over-view of cultivars, production, harvesting, and marketing

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Presentation Outline

- Climatic adaptation
- Cultivars non-astringent and astringent
- Site preferences
- Planting an orchard
- Fruit thinning
- Irrigation requirements
- Tree training and pruning
- Tree fertilization
- Pests and diseases
- Harvesting
- Ripening
- Fresh storage
- Drying
- Post-harvest processing

Climatic adaptation

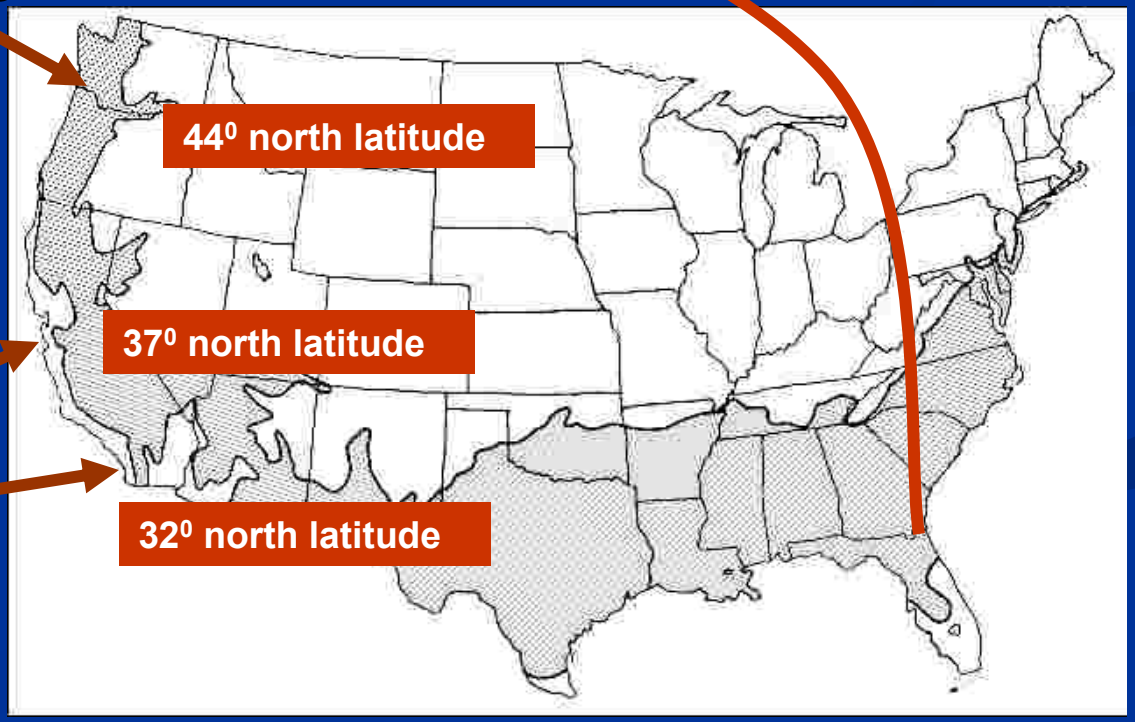
- Oriental persimmons do best in areas of moderate winters and dry summers.
- When fully dormant the trees can tolerate temps of 0^0 F (-17 ^{0}C).
- Trees have a low winter chilling requirement: less than 100 hours.

- Trees can break dormancy early and thus fall prone to spring frost injury.
- Ensure trees are placed on hilltops or areas with good air drainage.

40 º north latitude

Climatic adaptation

- In the United States persimmons grow in either the warm southern regions
- Into the mild Pacific Northwest.
- As well as the central and southern regions of California.



Climatic adaptation

- Trees grown on *D. lotus* and *D. virginiana* rootstock are best for temperate regions.
- In warmer regions the rootstock *D. kaki* is used

30 -35 º south latitude

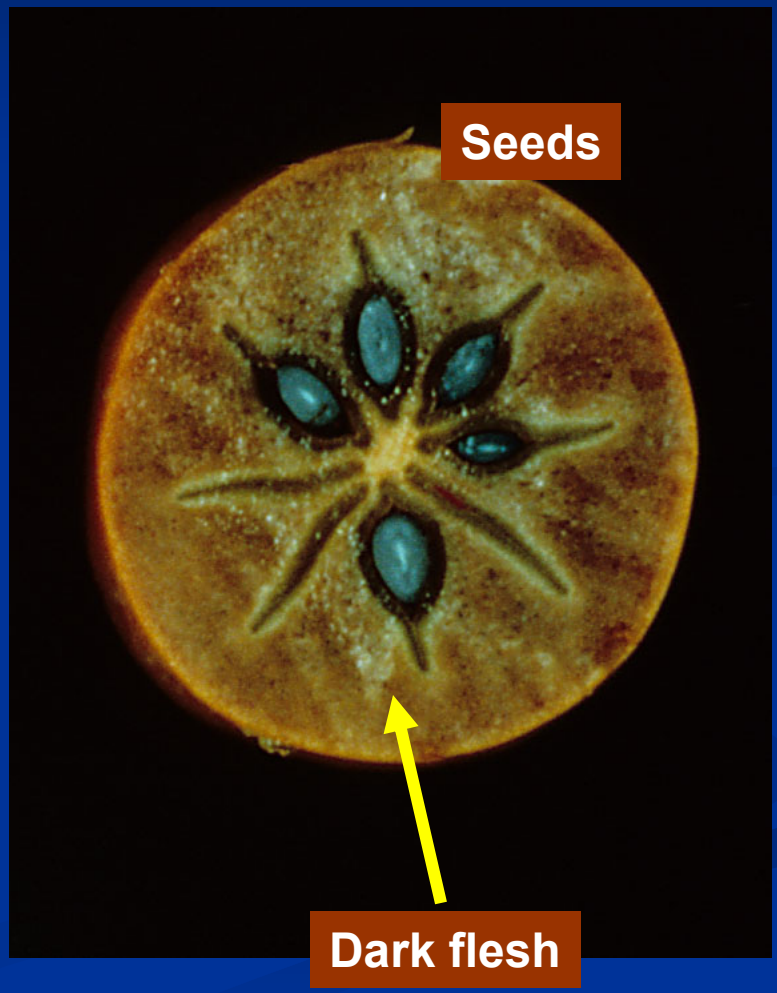
Cultivars

- Fruit are classified as either astringent or non-astringent.
- Non astringent cultivars loose their tartness when still hard, and can be consumed hard or soft.
- Astringent types must either be soft or artificially treated before they are suitable for eating.

Hachiya fruit: astringent type

Cultivars

- Cultivars also classified as to their response to pollination and presence of seeds.
- Non-stringent types are all pollination constant.
- For astringent cultivars a dark flesh results with seed development.
- Example: “Hyakume” astringent type.



Cultivars: World preferences

- Asian consumers prefer the firm non-astringent fruit.
- Grown predominately in Japan, Korea, New Zealand, and Australia.
- Now gaining popularity in non-Asian countries.

Fuyu cultivar

Cultivars: World preferences

- Astringent cultivars have predominantly been grown in the U.S., China, Italy, and Chile.
- Interest in astringent cultivars has fallen as the world has become smaller.
- Astringency of “Hachiya” can hurt consumer interest.

- Non-astringent cultivars such as “Fuyu” can be grown off-season and flown all over the world.

Cultivars: Non-astringent

- Classified under season of ripening:
- Early: “Izu”
- Mid-season: “Jiro” and “Hana Fuyu”
- Late-season: “Fuyu” and “Sagura”
- All of these cultivars are gaining prominence in Italy

Cultivar: “Fuyu”

- Non-astringent: can be eaten off the tree like an apple. Excellent in fruit salads.
- Pollination-constant, no dark streaking in the fruit flesh.
- Most popular cultivar in the world.
- Late ripening season.

In Japan “Fuyu” is also known as “Fuyugaki”

Cultivar: “Fuyu”

- Very popular in Japan.
- Large fruit (average of 220 grams).
- Fruit are round to oblate, but generally does have 4 sides.
- Fruit have to be thinned in order to ensure size.

Cultivar: “Fuyu”

- Skin is tough and glossy.
- Often orange-red in color.
- Skin covered by heavy bloom.
- In warm climates skin turns red at harvest.

Cultivar: “Fuyu”

- Medium vigor
- Only female flowers
- High fruit set

Cultivar: Jiro

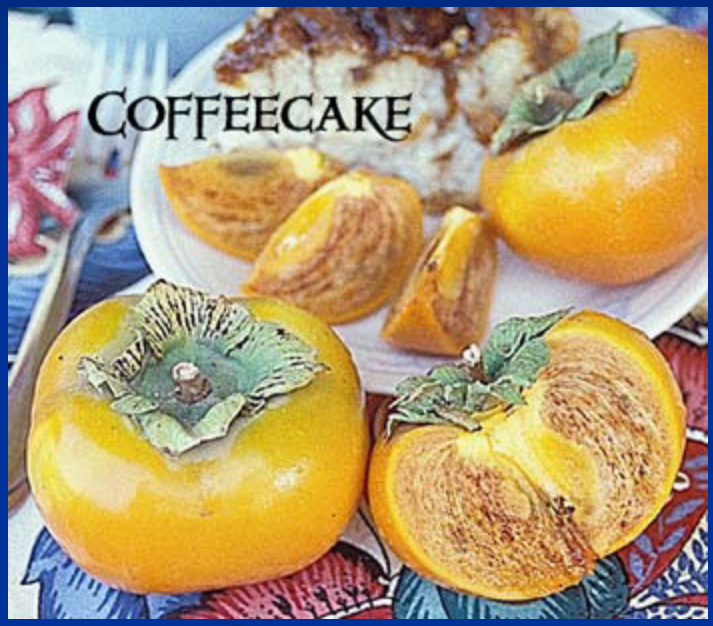
- Non-astringent “Fuyu” strain.
- Pollination constant: no dark flesh.
- Large fruit (180-250 grams).
- “Fuyu” like shape.
- Ripens 1-2 weeks before “Fuyu”

Cultivar: Jiro

- Medium low vigor like “Fuyu” trees.
- High productivity.

Cultivar: “Coffeecake”

- A non-astringent “Fuyu” cultivar popular in southern California.
- Ripe 1 month before “Fuyu”
- Good for climates where “Fuyu” may not ripen well
- Spicy-sweet flavor.



Pollination variant: use Chocolate cultivar for cross pollination

Cultivar: “Suruga”

- Non-astringent
- Pollination constant
- The sweetest non-astringent persimmon
- Same size as “Jiro”
- Ripens 2 weeks after “Fuyu”.
- Same tree vigor as “Jiro” and “Fuyu” trees.

Cultivar: "Hachiya"

- Most popular astringent cultivar.
- Large fruit (average of 220 grams).
- Oblong cone-shaped fruit.
- Older cultivar used in drying in the Orient.

Cultivar: “Hachiya”

- Pollination constant: not prone to dark flesh.
- Generally seedless
- Was popular in the 1940’s in California.
- Sweet and juicy flavor when it cures.
- Easily bruised if miss-handled.

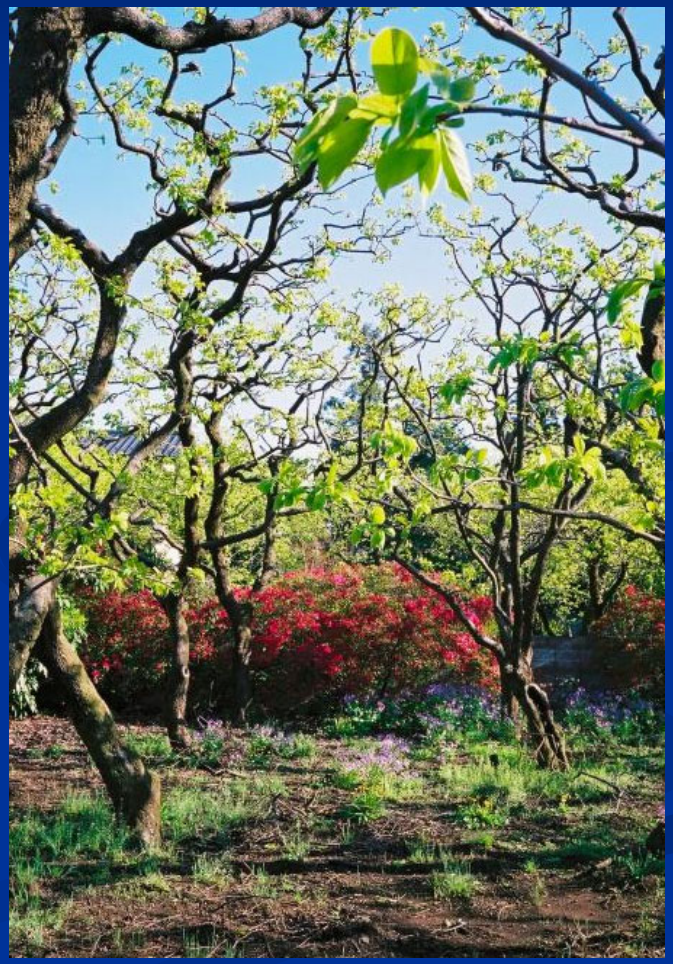
Cultivar: “Hyakume”

- Non-astringent,
- Pollination variant: seeds cause dark flesh.
- Fairly good quality,
- Unattractive skin color

“Zenjimaru” very much like “Hyakume” but fruit ripen 1 month earlier

Site preferences

- Persimmon grows best on loamy soils.
- Can tolerate heavy clay soils if drainage is not severely impeded.
- Sandy soils o.k. if irrigation is available
- Soil pH of 6.0 to 6.5 is preferred.



Planting an orchard

- Orchard spacing is determined by the variety selected.
- Both “Fuyu” and “Jiro” can be planted 3 by 4 meters or closer in sandy soils.
- “Hachiya” is a larger tree, requires 6 by 6 meters.

Orchard rootstocks

- *Diospyros lotus* is the primary rootstock used in northern Japan, Italy, and California persimmon orchards.
- *D. lotus* is adapted to a wide variety of soil types
- Not tap rooted
- Can tolerate the high moisture content found in many heavy soils containing hard pan.

Orchard rootstocks

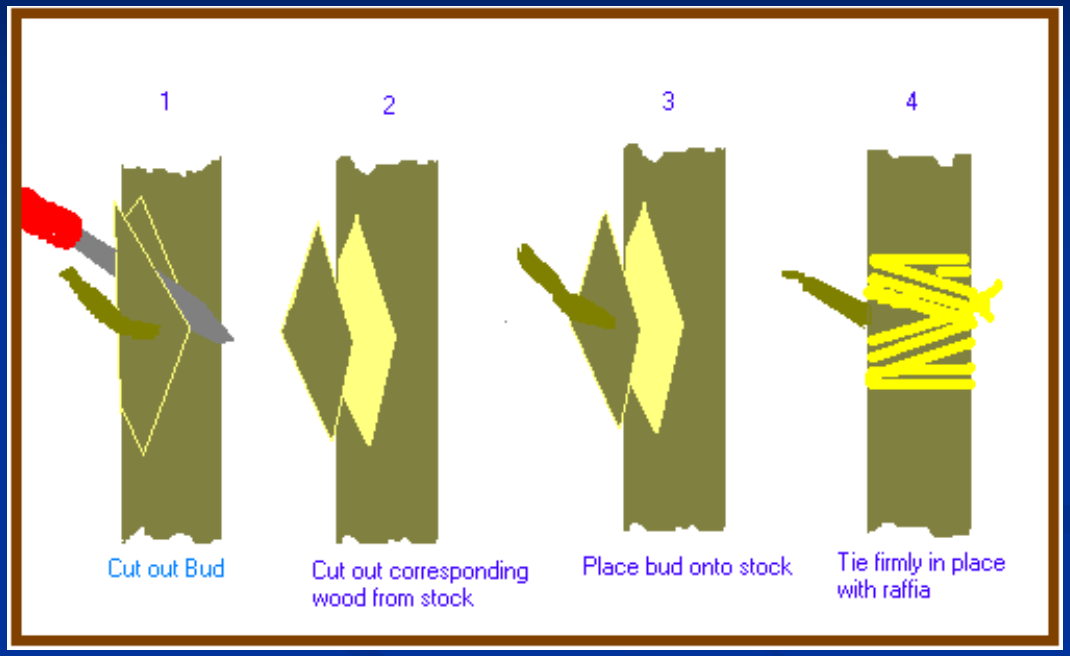
- Other rootstocks occasionally found include *D. kaki*, which has a long taproot.
- *D. kaki* rootstock should be only use for very warm growing regions (southern Italy).
- Often preferred for “Fuyu” production in warm areas.

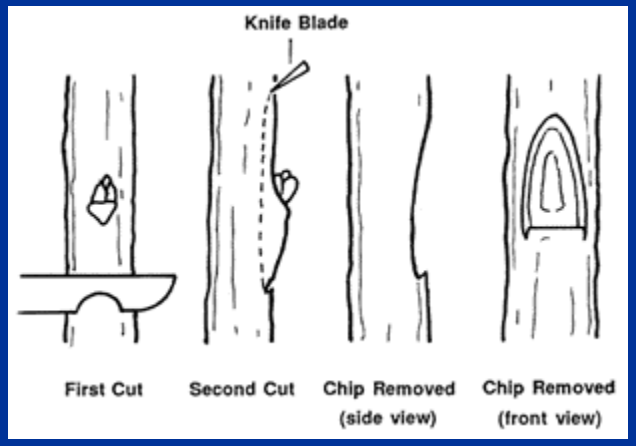
Tree Propagation

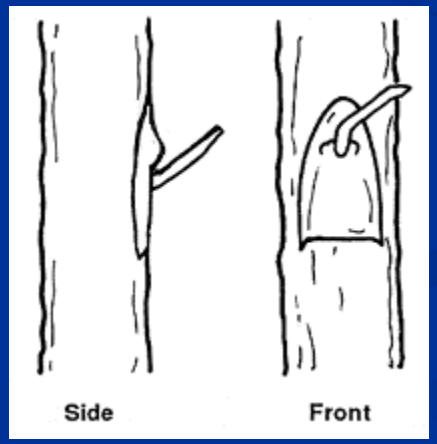
- Seeds from the mature fruit are used for rootstocks.
- Don’t use seeds for the entire tree as they do not come true to type.
- Seeds can be sown outdoors.
- Better to start in the greenhouse in pots.

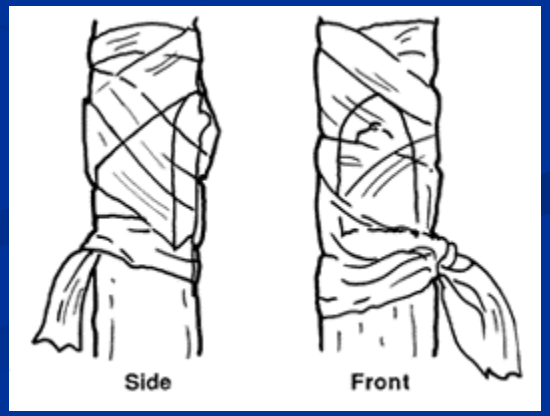
Mature seeds from “Fuyu”

Plant propagation: chip budding









Fruit thinning

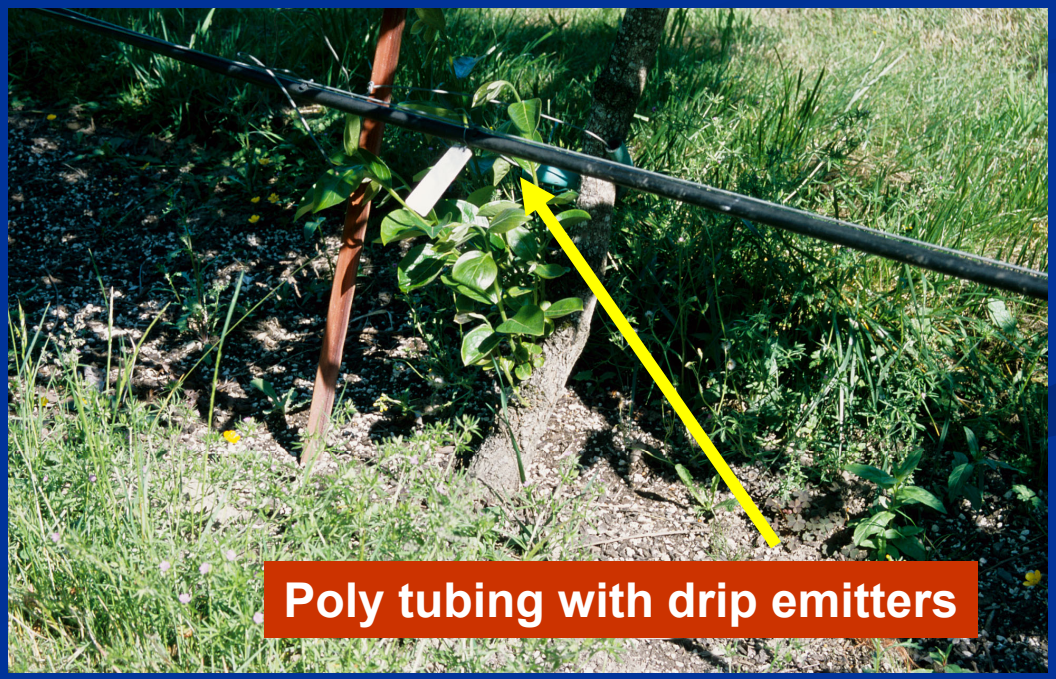
- Persimmons tend to biennial bearing.
- Mature trees still bear but yields are low.
- Hand thin in early summer 3 weeks after flowering.
- Leave 1-4 fruit per shoot.

Female flower

"Fuyu" persimmons in Florida

Irrigation requirements

- Persimmons widely adaptable to wide range of soil moisture regimes.
- Soils should be moist in the spring to ensure leaf growth, fruit set, and fruit development.
- In dry regions trees need 36-48” (91-122 cm) of supplemental irrigation.



Irrigation requirements

- Extreme drought will cause the leaves and fruit to drop prematurely.
- Young trees are most susceptible to drought.
- Drought stressed trees will often bear sunburn fruit.

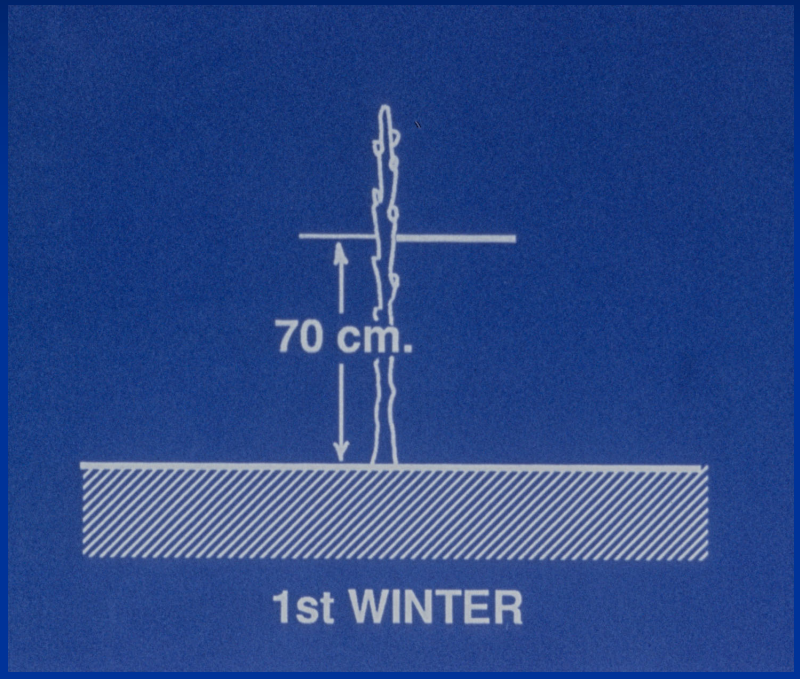
Tree training and pruning

- Tree training is either an open vase style or a modified central leader style.
- “Hachiya” is generally trained to a modified central leader.
- “Fuyu” and “Jiro” orchards use an open vase system.

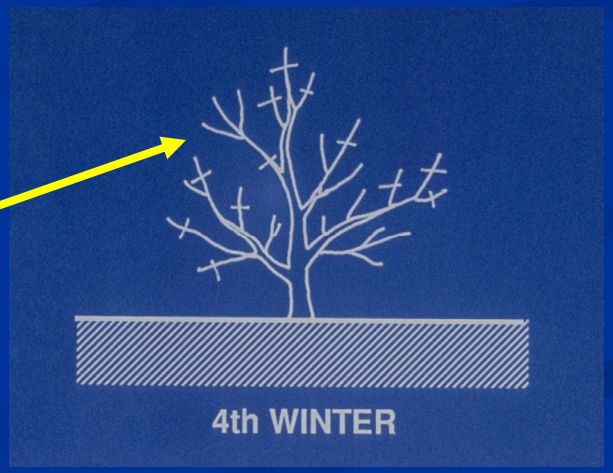
Central leader training

- Stake young trees for fist 2-3 years.
- Young trees: first branches should start at 1 meter above ground.
- Select 3-5 main limbs at .3 m intervals around tree.
- Head back growth for 1-2 years.

Central leader training

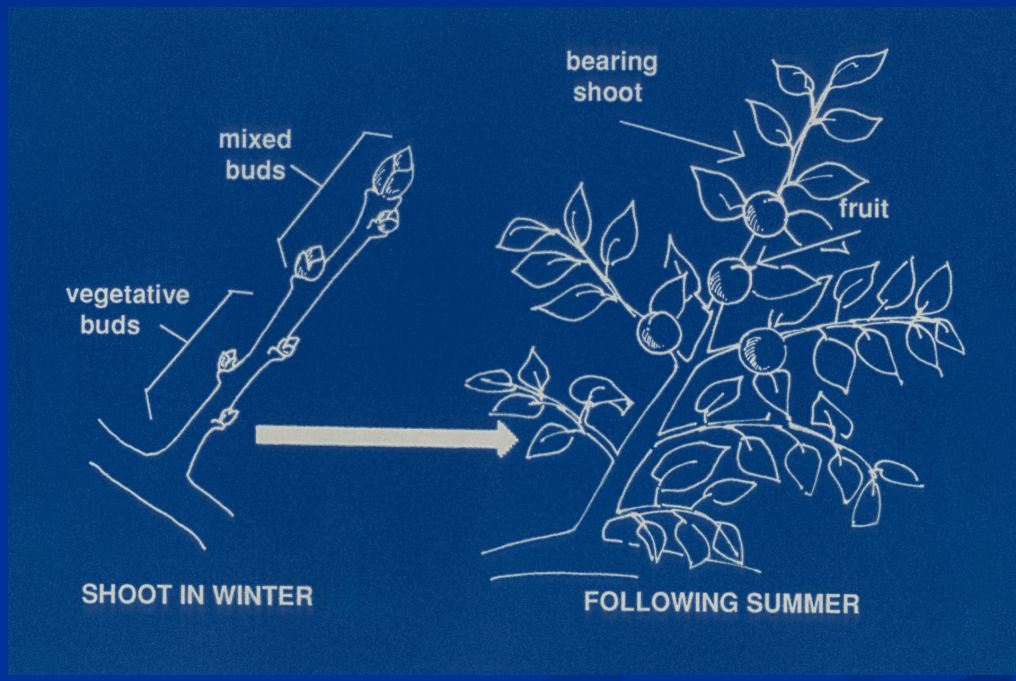


Keep heading back shoots as the tree ages



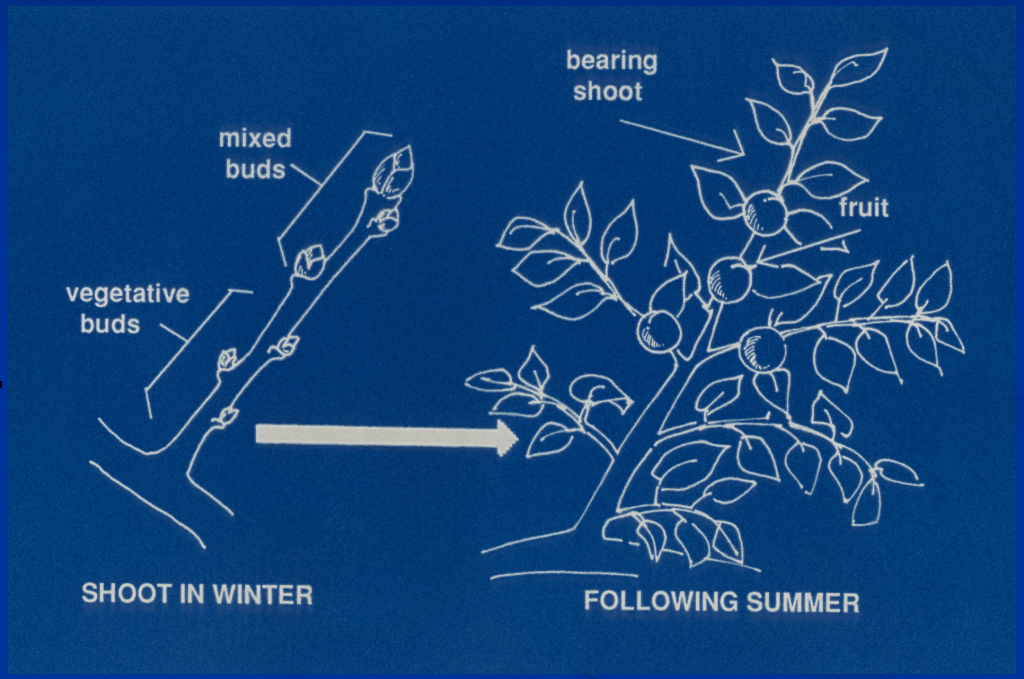
Central leader training

- Upright shoots with narrow crotch angles are weak.
- Branches can break under fruit load.
- Trim back central leader.
- Head shoots to encourage branching.



Heading cuts

- Fruit are borne on current season's shoots.
- Moderate pruning stimulates new growth.
- Excessive pruning leads to fruit shedding.



Upright shoots

- Trees naturally develop upright shoots.
- Growers often tie limbs with cords to keep the trees from breaking.

Over-grown trees

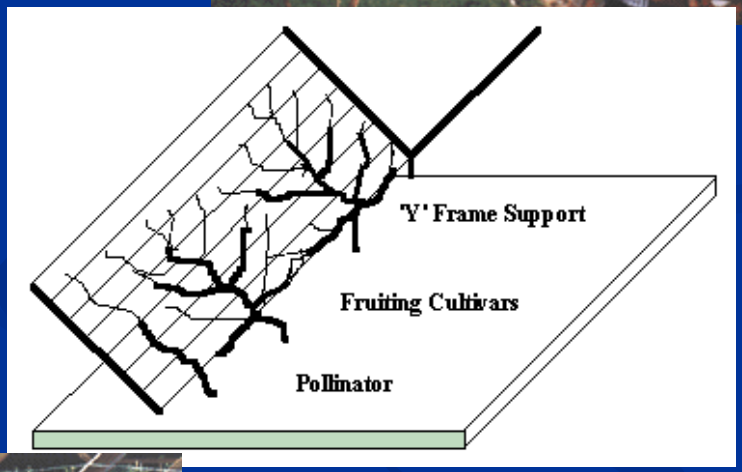
- Mature trees should have annual light cuts.
- Cut out cross-over, diseased, or broken limbs.
- If large saw cuts are needed the tree has been neglected.
- Consider replanting.

Tree fertilization

- Trees take up to 10 years to come into full production.
- Good inherent soil fertility is important.
- General recommendation of .45 kg of nitrogen for each year of tree age.
- Split application in spring, and then in early June

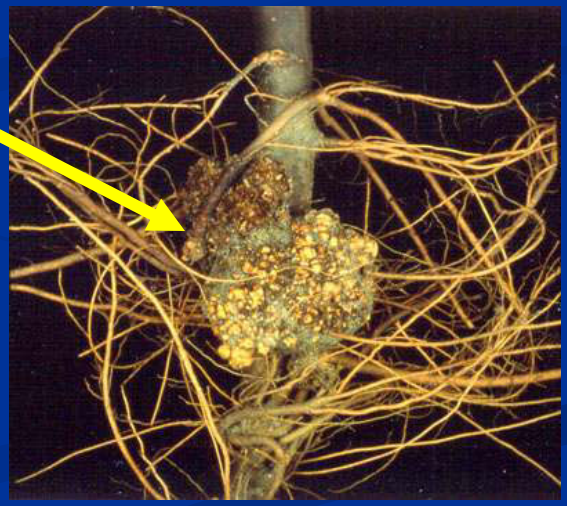
Modern pruning: Y trellis

- New Zealand industry trying to grow “Fuyu” under cooler climates.
- Will involve more hardware.
- Skilled pruning.
- Result: vigorous trees which can be kept small and easily harvested.



Pests and diseases

- Generally free from most pests, diseases.
- Italy reports crown gall on young trees.
- Fruit fly injury reported in Asia.



Harvesting

- Harvest non-astringent “Fuyu” and “Jiro” fruit when the they are fully colored.
- 'Jiro' ripens a week earlier than 'Fuyu‘.
- Astringent cultivars are picked when they are soft or shortly before.

Fruit Harvest

- Clip each fruit individually leaving a short piece of stem.
- Can also pull the fruit off.
- Twist fruit ½ turn and then pull in the same direction as the twig they are attached to is growing.
- Handle carefully to avoid bruising.

Nearly ripe “Jiro” persimmons

Fruit harvest

- Harvest for non-stringent types often occurs with first frost.
- Fruit can be held on the trees.
- But birds and
- Rodents are often attracted to the fruit.

crow

raccoon

Fruit ripening: non-astringent

- "Fuyus" are ripe and ready to pick in October, November and December.
- They are ripe when the fruit changes from green to orange stage.
- "Fuyu" is best eaten when orange and firm.
- They are crisp like an apple and sweet like a pear.

California "Fuyu" persimmons from southern California

Fresh fruit sales

- In colder regions persimmons will keep with refrigeration into the fall, early winter.

Persimmons sold at outdoor market in the fall in Russia.

Fruit ripening: astringent

- Astringency comes from water-soluble tannins.
- Decrease as the fruit softens, either before or after the fruit is picked

Fruit ripening: Astringent

- Allow “Hachiya” to sit at room temperature until astringency is lost.
- However over-ripe fruit is difficult to handle.
- In home situations set “Hachiya” fruit in a bag with apples.

Fruit ripening: Astringent

- Commercially treated “Hachiya” fruit with 10 ppm ethylene ripens in 2 days.
- But, fruit softens too much.
- Better: Treat “Hachiya” with 80% CO_2 for 24 hours.
- In Hawaii 27 kg of fruit is treated with .6 kg dry ice for 2-3 days.

"Hachiya persimmon"

Fresh fruit storage

- Non-astringent types have longer shelf-life.
- “Izu” 10 days.
- “Fuyu” maybe 20-30 days.

Fresh fruit cold storage

- To extend shelf life of "Fuyu" keep ripe fruit at 0 ^{0}C. Fruit lasts 2 months.
- With controlled atmosphere storage of 5-8% CO_2 and 2-3% O_2 fruit may last 5-6 months.
- "Hachiya" best stores at 0 ^{0}C.

Fresh fruit storage: chilling injury

- "Fuyu" suffers with cold storage temperatures between 5 ^{0}C - 15 ^{0}C.

Fruit drying

- In Japan and China the cultivar “Hachiya” is picked when firm,
- Peeled,
- Tied to strings or poles to air dry.

Fruit drying: outside

- Dried under the eaves of the home for 30-50 days.
- Sugar crystals will form on the skin of the fruit.
- Fruit can contain 50% sugar.

Fruit drying: outside

- Drying removes astringency.
- For drying use “Hachiya”, and “Hyakume” cultivars.
- Dry fruit has to be kept in sealed containers so that they will not spoil.

“Hachiya” persimmons

Fruit drying: indoors

- Can be dried in home oven.
- Peel fruit.
- Slice into strips 6 mm thick.
- Place on wire racks in oven.

- Set oven to 60 ^{0}C.
- Dry when fruit is not sticky any longer.
- Keep dried fruit sealed, or it may spoil.

Fruit drying: not for “Fuyu”

- Do not dry “Fuyu”, “Jiro”, and “Suruga”
- Non-astringent types will not dry properly.
- Flesh will become very hard and tough.

Post-harvest uses

- Persimmons can be frozen.
- Pureed for use in baking, jams, cookies, pies, cakes.
- Don’t use “Hachiya” fruit with black spots on peel. Peel first.

Persimmon jam from Maui Hawaii.