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°F (-17°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° 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° south latitude
Cultivars

- Fruit are classified as either astringent or non-astringent.
- Non astringent cultivars lose 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.
Asian consumers prefer the firm non-astringent fruit.  
Grown predominately in Japan, Korea, New Zealand, and Australia.  
Now gaining popularity in non-Asian countries.
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

Map showing 42° north latitude
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
- 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 mishandled.
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 only be used 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

1. Cut out Bud
2. Cut out corresponding wood from stock
3. Place bud onto stock
4. Tie firmly in place with raffia
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.

“Fuyu” persimmons in Florida
Irrigation requirements

- Persimmons are widely adaptable to a 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.

Poly tubing with drip emitters
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 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.

[Images of pests and diseases]
Harvesting

- Harvest non-astringent “Fuyu” and “Jiro” fruit when 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.
“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% CO₂ for 24 hours.
- In Hawaii 27 kg of fruit is treated with .6 kg dry ice for 2-3 days.
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 °C. Fruit lasts 2 months.
- With controlled atmosphere storage of 5-8% CO₂ and 2-3% O₂ fruit may last 5-6 months.
- "Hachiya" best stores at 0 °C.
"Fuyu” suffers with cold storage temperatures between 5°C - 15°C.
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 °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.