Persimmon: From Phenotypes to Preservation

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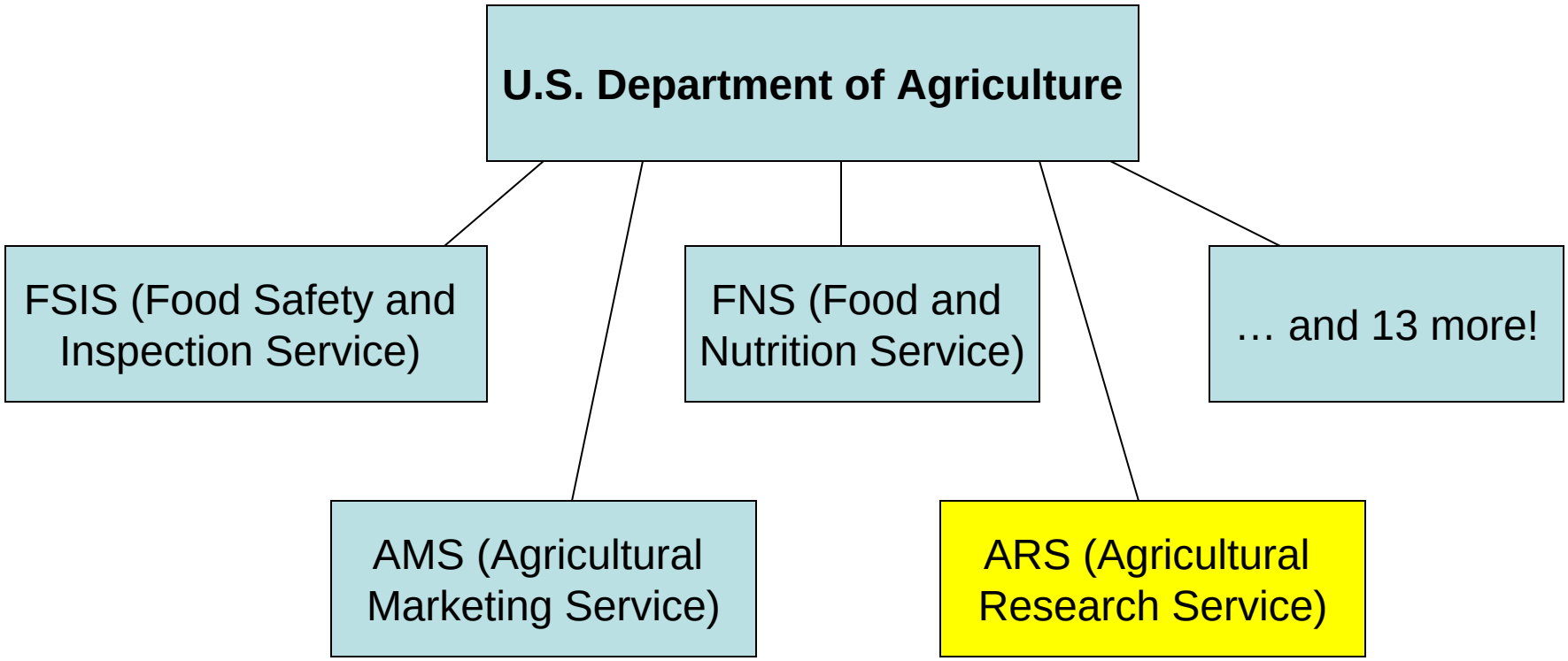

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Project

Enhancing Marketability

California Dept. of Food and Agriculture Specialty Crop Block Grant Program Project #14-003:

“Enhancing the marketability of California persimmons”

Project Director
Dr. Andrew Breksa

Co-Investigator
Dr. John Preece

Co-Investigator
Dr. Rebecca Milczarek

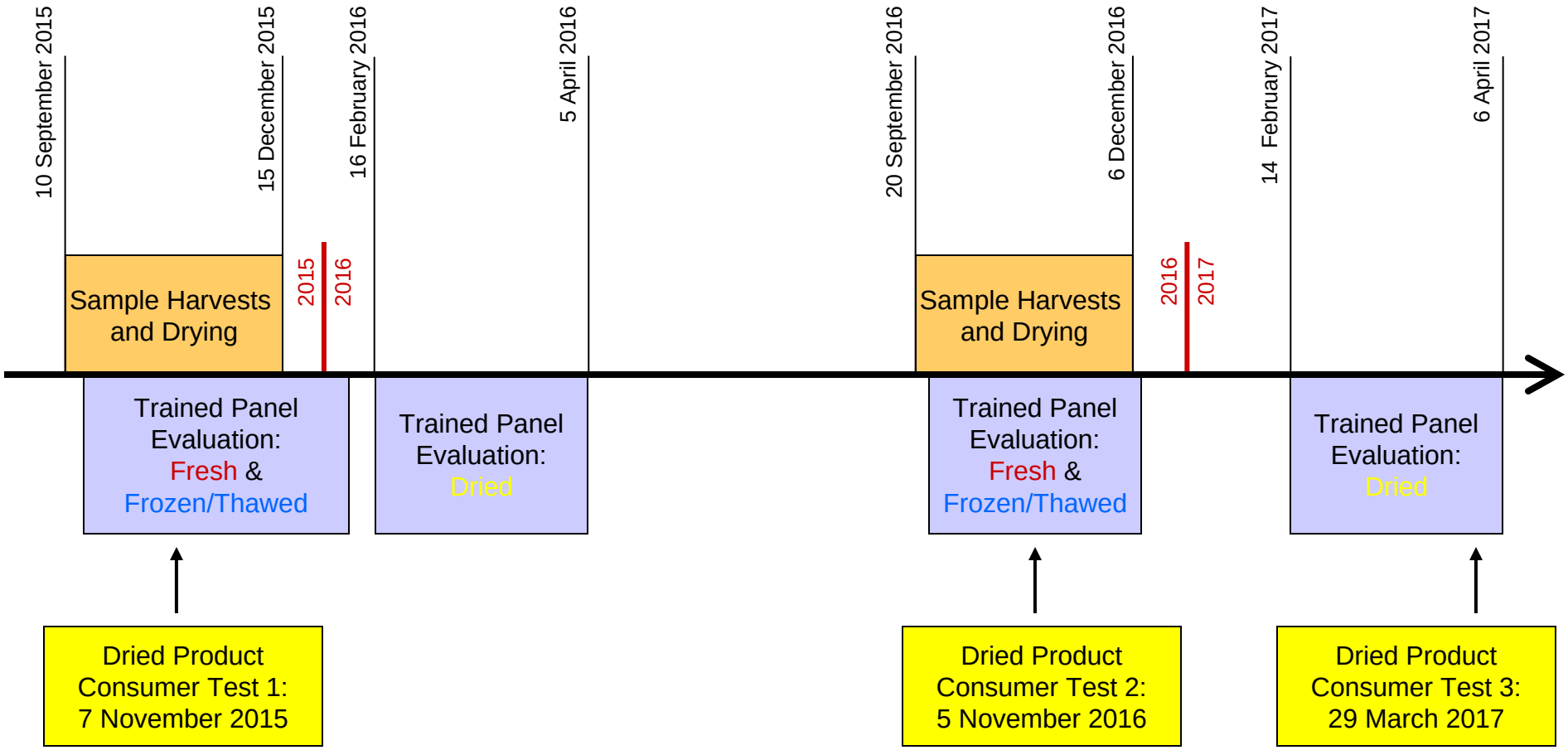
Enhancing Marketability

California Dept. of Food and Agriculture Specialty Crop Block Grant Program Project #14-003:

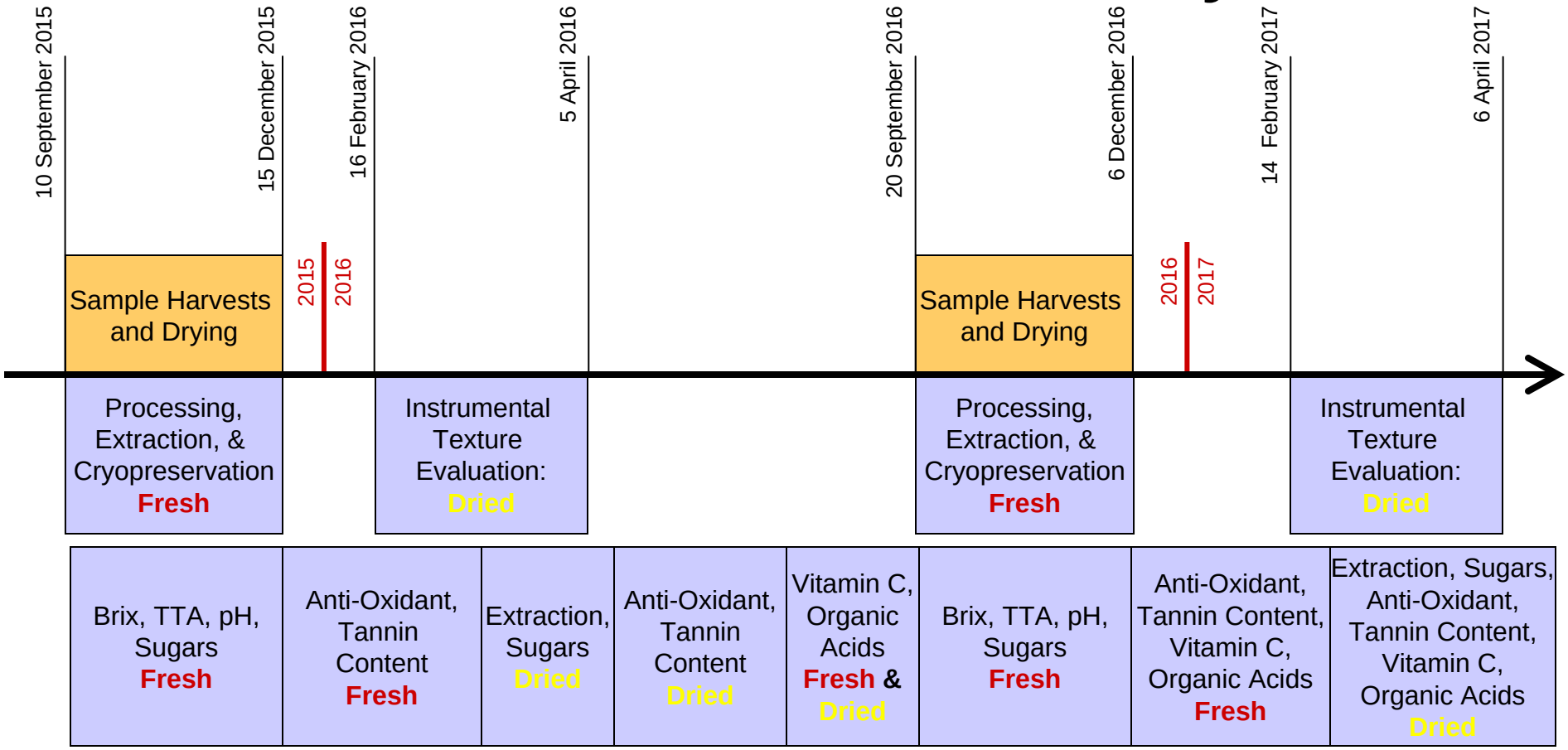
"Enhancing the marketability of California persimmons"

- goal = increase the profitability of California persimmons in three ways
  - evaluating the vitamin/nutrient content and flavor of 55 persimmon cultivars
  - developing protocols to rapidly dry persimmons
  - recommending which cultivars consumers prefer

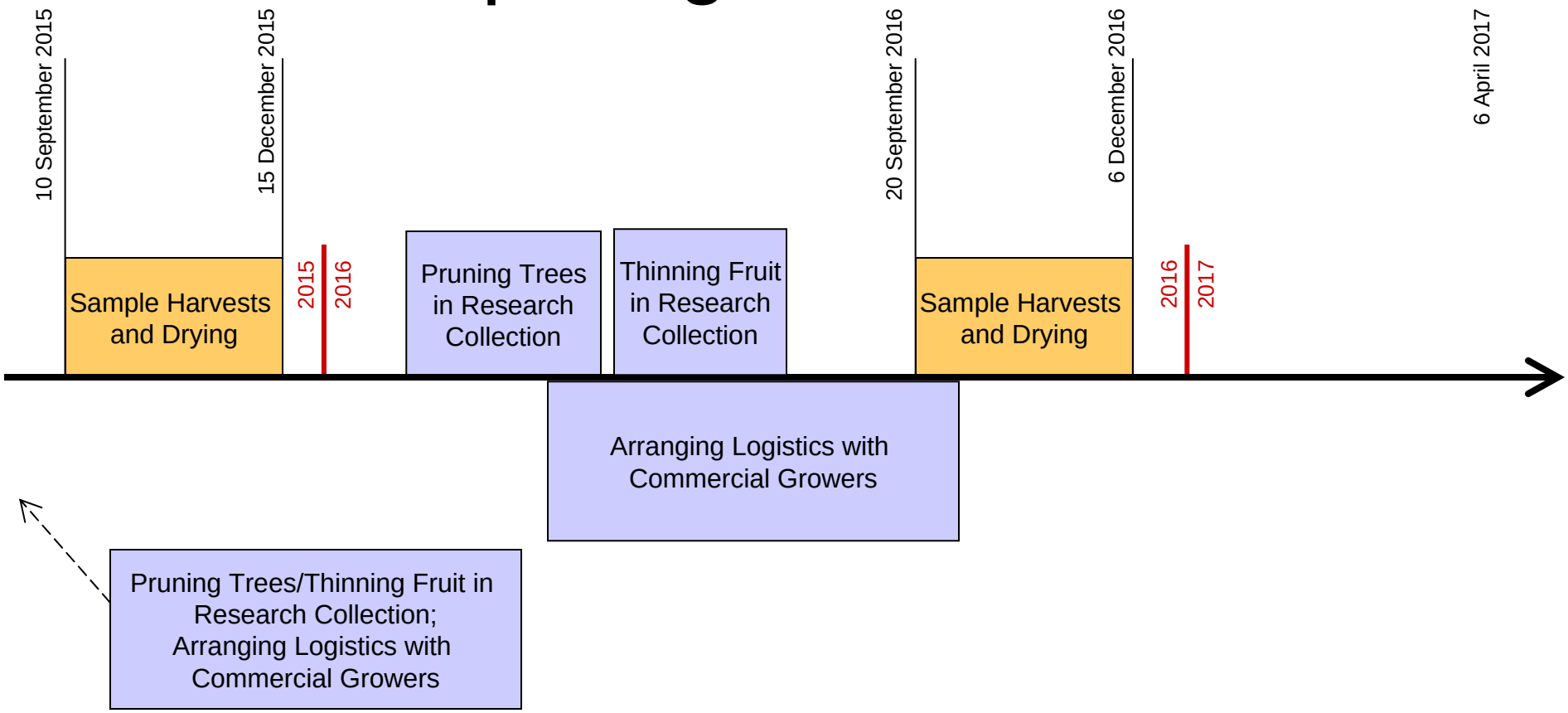
Project Timeline: Sensory



Project Timeline: Chemical & Instrumental Texture Analyses



Project Timeline: Preparing for Harvests



March to September 2015

The 119 Samples

- "sample" =
  fruit from one persimmon cultivar,
  harvested at one source,
  on one particular date

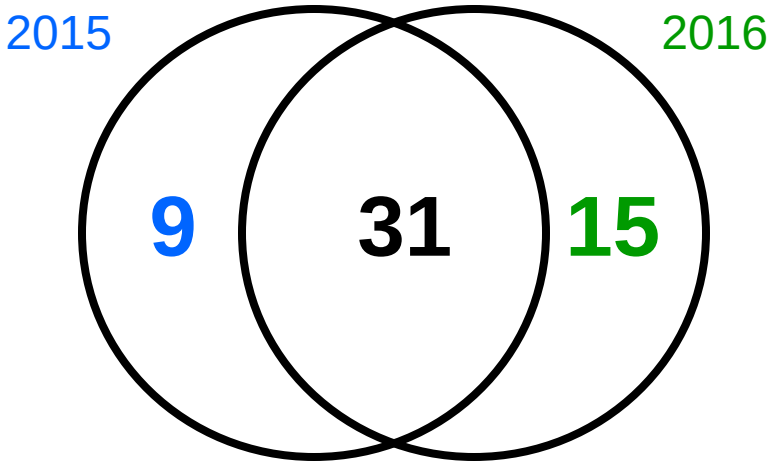
Sidebar: What is a “cultivar”?

persimmon scientific name:

Diospyros kaki var. xyz

The 119 Samples

- "sample" =
  fruit from one persimmon **cultivar**,
  harvested at one source,
  on one particular date
- 55 cultivars (40 in Fall 2015, 46 in Fall 2016)



black font = tested both years
blue font = unique in Fall 2015
green font = unique in Fall 2016

The 119 Samples

[unnamed]	Fuji	Hachiya	Lycopersicon	Nui Nai	Thiene
Akoumanzaki	Fujiwaragosho	Hanagosho	Maekawa Jiro	Okugosho	Tishihtzu
Brazzale	Fuyu	Hazegosho	Mandarino	Rispoli	Vainiglia
Chienting	Fuyu Imoto	Ichidagaki	Maru	Rose Yanka	Yeddo
Chocolate	Fuyu Jiro	Ichikeijiko	Matsumoto Wase Fuyu	Saijo	Yotsumizo
Costata	Giant Fuyu	Izu	Mikatani Gosho	Sangokuichi	
Emon	Giombo	Jiro	Mishirasu	Suruga	
F-444	Gofu	Kakiyamagaki	Moro	Syouro	
Farmacista Honorati	Great Wall	Korean	Muraya	Tamkam	
Fennio	Guang Yang	Lampadina	Nishimura Wase	Tanenashi	

black font = tested both years
blue font = unique in Fall 2015
green font = unique in Fall 2016

The 119 Samples

- "sample" =
  fruit from one persimmon cultivar,
  harvested at one **source**,
  on one particular date
- *4* sources
  - National Clonal Germplasm Repository (NCGR) – Davis, CA - *96*
  - L.E. Cooke Co. – Visalia, CA - *19*
  - Oak Acre Farms – Live Oak, CA - *3*
  - O. Bertolero – Santa Rosa, CA - *1*

The 119 Samples

- "sample" =
  fruit from one persimmon cultivar,
  harvested at one source,
  on one particular **date**

- fruit stored for average of 7 days before drying

“But wait…”

“…what’s this
‘Freeze-Thaw’ business?”

Phenotypes

The 3 Types of Persimmon

Nonastringent

- harvested when commercially ripe (at least some orange blush on skin)
- flesh is always orange, regardless of whether or not the fruit has seeds
- nonastringent (palatable) when firm and ripe ☺
- ‘Fuyu’ is most common nonastringent cultivar

The 3 Types of Persimmon

Astringent

- harvested when commercially ripe (at least some orange blush on skin)
- flesh is always orange, regardless of whether or not the fruit has seeds
- astringent (not palatable) when firm and ripe ☹
  - need to “mellow” and lose astringency in order to be palatable
- ‘Hachiya’ is most common astringent cultivar

The 3 Types of Persimmon

Pollination-Variant (a.k.a. Variant)

- harvested when commercially ripe (at least some orange blush on skin)

flowers ***not*** **pollinated**
in the spring →
no seeds upon harvest →
flesh color stays orange &
tastes and acts like astringent cultivars

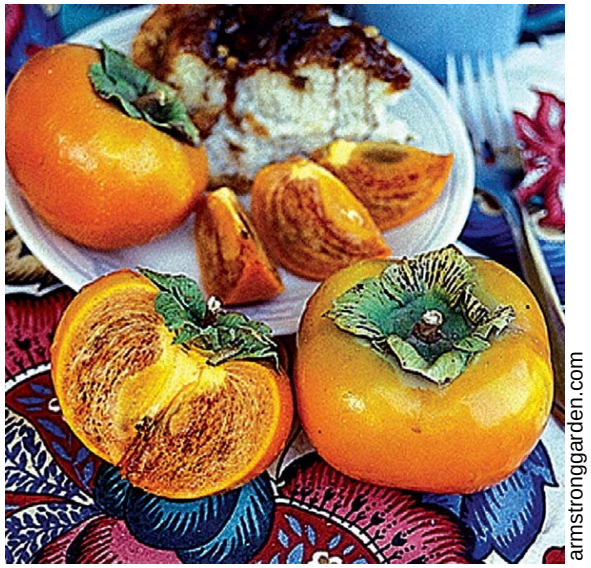
craziestgadgets.com

flowers **pollinated**
in the spring →
seeds upon harvest →
brown speckled flesh color &
tastes and acts like nonastringent cultivars

The 3 Types of Persimmon

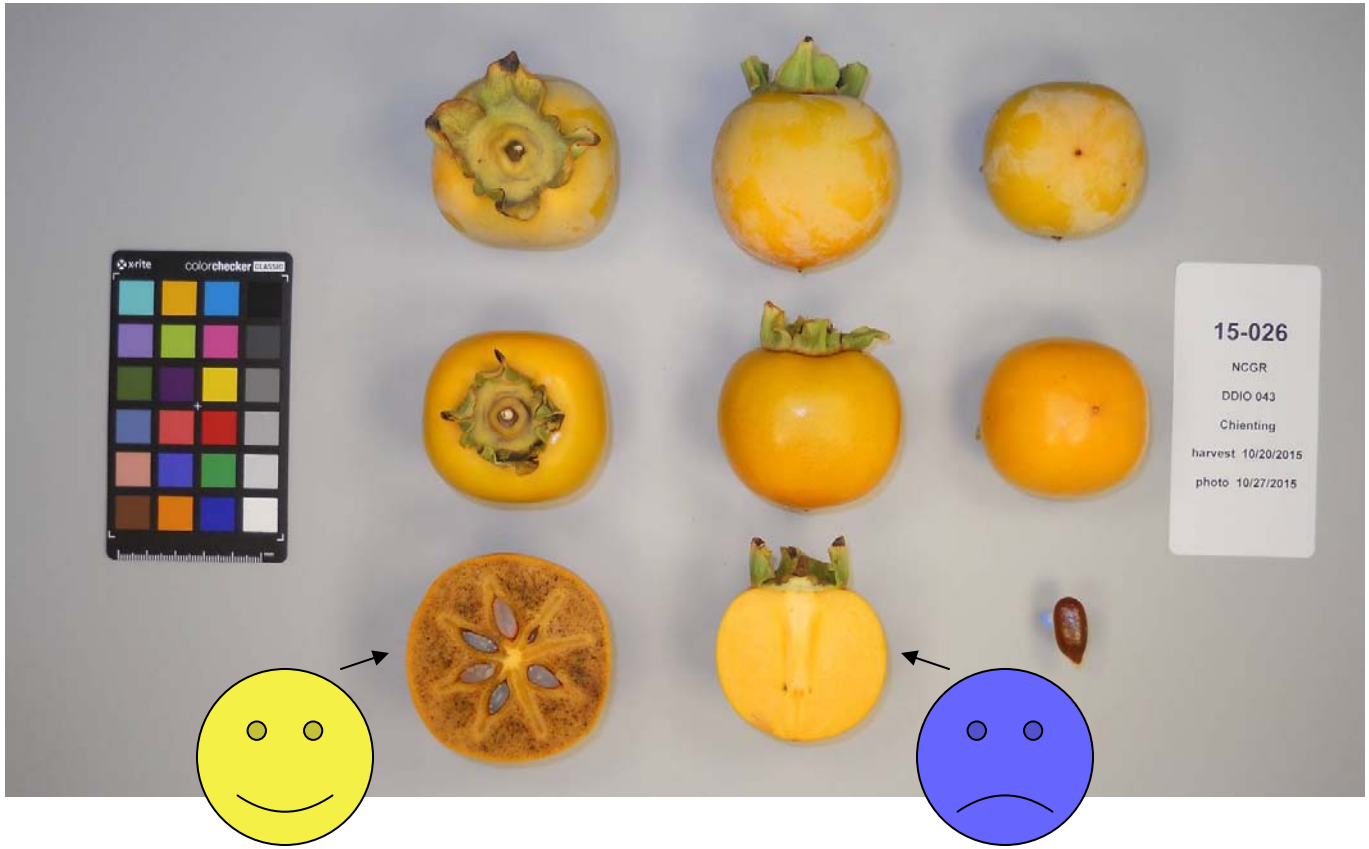
Pollination-Variant (a.k.a. Variant)

- "Chocolate" and "Coffee Cake" are common names for some variant cultivars



The 3 Types of Persimmon

Pollination-Variant (a.k.a. Variant)



How to Remove Astringency from Astringent and Unpollinated Variant Persimmon Cultivars

1. Let fruit sit at room temperature until flesh is jelly-soft. (common method that consumers use with Hachiyas)
2. Expose to ethylene gas.
3. Expose to carbon dioxide gas.
4. Expose to ethanol.
5. Freeze and thaw.

Preservation

Hoshigaki

~4 weeks

top-left photo: Neal P., taken at Benu Restaurant (San Francisco)
https://www.instagram.com/p/-VDJLTAbrf/
other photos: Russell Yip, The San Francisco Chronicle
http://www.sfchronicle.com/food/article/Hoshigaki-time-Bay-Area-chefs-embrace-elaborate-6654730.php

Preserved Pulp

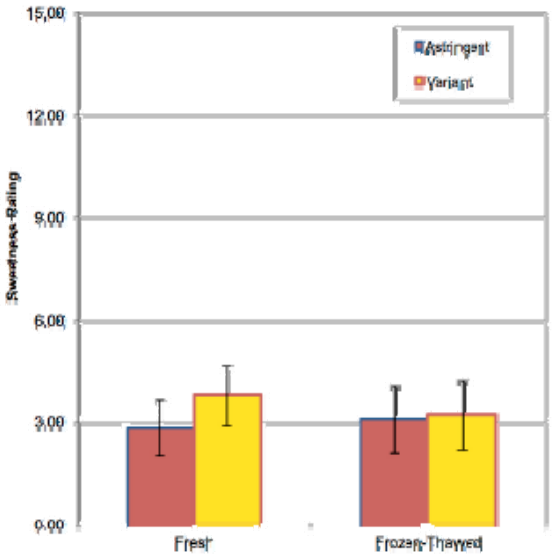
- frozen pulp
- jam
- pie filling

Frozen Slices

- freezing reduces astringency for some (but not all) Astringent and unpollinated Variant cultivars
- luckily, ‘Hachiya’ is a good responder to freeze-thaw treatment
- did not test blanching
- did not test sugar addition
- did not test acid addition

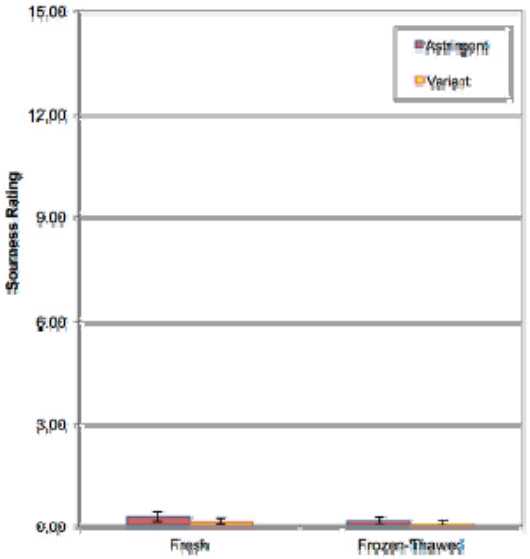
Line Attribute Results for Frozen-Thawed

Sweetness: Fresh vs. Frozen-Thawed



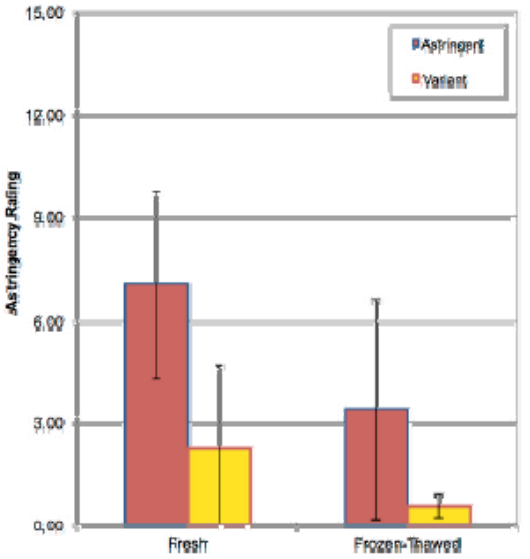
no significant difference from Fresh to Frozen-Thawed

Sourness: Fresh vs. Frozen-Thawed



significant decrease from Fresh to Frozen-Thawed, but small in absolute value

Astringency: Fresh vs. Frozen-Thawed

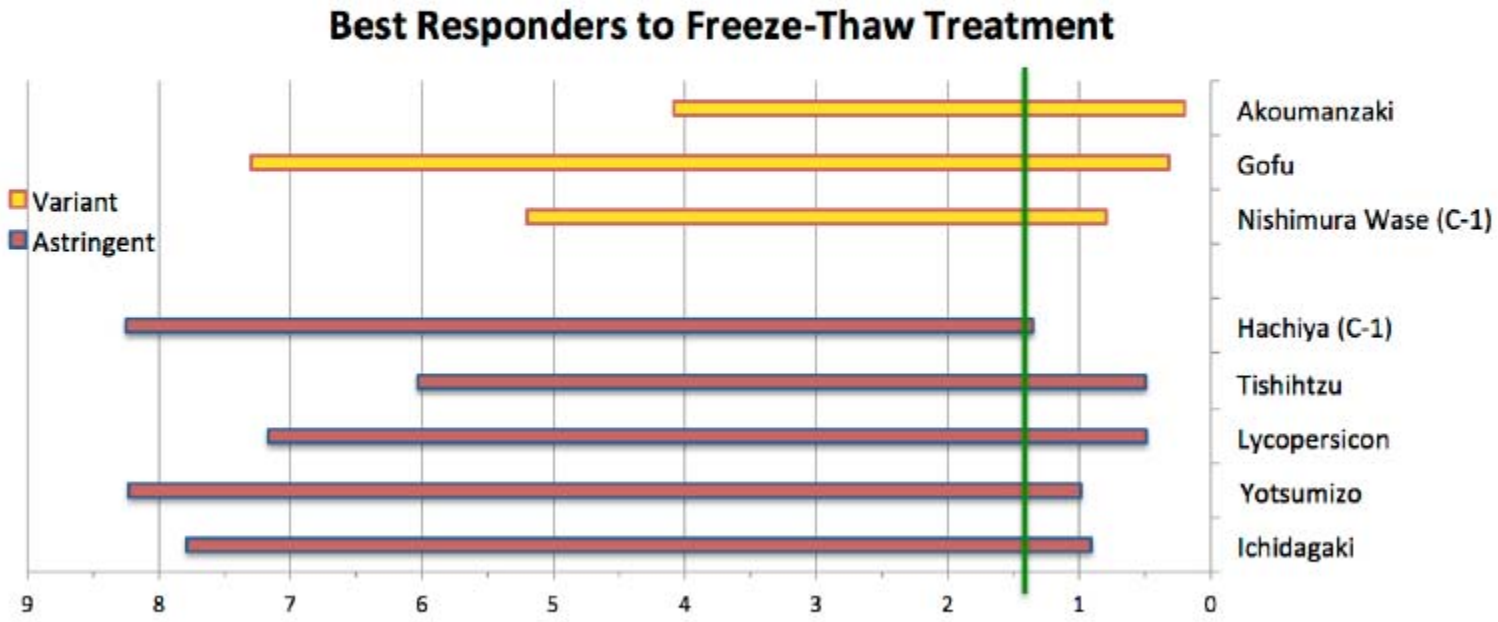


significant decrease from Fresh to Frozen-Thawed, and large in absolute value

error bars represent +/- 1 standard deviation

[*this slide from Sedej et al. "Reducing astringency in persimmons through processing, an approach for increasing marketability", presented at the American Chemical Society Nat'l Meeting & Expo - Philadelphia, PA - 22 Aug 2016*]

Sensory Freeze-Thaw Summary



[*this slide from Sedej et al. "Reducing astringency in persimmons through processing, an approach for increasing marketability", presented at the American Chemical Society Nat'l Meeting & Expo - Philadelphia, PA - 22 Aug 2016*]

Hot Air Drying

- water rinse > 200 ppm chlorine > water rinse
- slice to 5 mm on commercial meat slicer
- 125°F (52°C) for 18 hours → safe but over-dried
- did not test blanching
- did not test sugar addition
- did not test acid addition

What **Not** to Do With Hot Air Drying

Do Not…

- remove the seeds ahead of time (easier to pick them out after drying)
  - – active debate on kitchen knife vs. mandolin

Seeds

What **Not** to Do With Hot Air Drying

Do Not…

- remove the seeds ahead of time (easier to pick them out after drying)
  - – active debate on kitchen knife vs. mandolin
- wait til astringent/unpollinated-variant fruits are mellowed
  - – too soft to safely slice

Squishy Fruit Are Difficult to Slice

What **Not** to Do With Hot Air Drying

Do Not…

- remove the seeds ahead of time (easier to pick them out after drying)
  - – active debate on kitchen knife vs. mandolin
- wait til astringent/unpollinated-variant fruits are mellowed
  - – too soft to safely slice
- dry pollinated (brown) variants

Dried Variants

These taste good but have awful appearance and texture.

Thank you for your attention!

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For additional information…

Persimmon Project Website:
https://www.ars.usda.gov/PersimmonCDFA2014Project.html