



# 2018 | THE ALMOND CONFERENCE

VARIETIES: PRODUCTION AND QUALITY ATTRIBUTES — LESSONS  
LEARNED AND THE PATH FORWARD FROM THE COMMERCIAL  
PERSPECTIVE

ROOM 312-313 | DECEMBER 4, 2018





# Continuing Education Units (CEU's)

- **What type of CEU's are offered at conference?**
  - Tuesday – Certified Crop Advisor (CCA)
  - Wednesday – Certified Crop Advisor (CCA)
  - Thursday – Certified Crop Advisor (CCA) and Department of Pesticide Regulations (DPR)
- **Where are the CEU sign in sheets?**
  - CEU sign in sheets will be in the back of each session
  - There are separate forms on Thursday for the CCA and DPR credits
- **Special instructions for Thursday**
  - PCA's will need to pick up their scantrons in the morning before the first session of the day. They will also need to return the scantron at the end of the day to the CEU booth. This is in addition to signing in and out of each session.

# AGENDA

- **Karen Lapsley**, Almond Board of California, moderator
- **Grant Thorp**, Plant and Food Research Australia
- **John Slaughter & Kaylan Roberts**, Burchell Nursery
- **Chuck Fleck**, Sierra Gold Nurseries
- **Grant Zaiger**, Zaiger Genetics
- **John Duarte**, Duarte Nursery
- **Mark Kline**, The Hershey Company







# 2018 | THE ALMOND CONFERENCE

ALMOND BREEDING: IS THERE A ROLE FOR NEW  
GENETIC TECHNOLOGIES?

ROOM 312-313 | DECEMBER 4, 2018

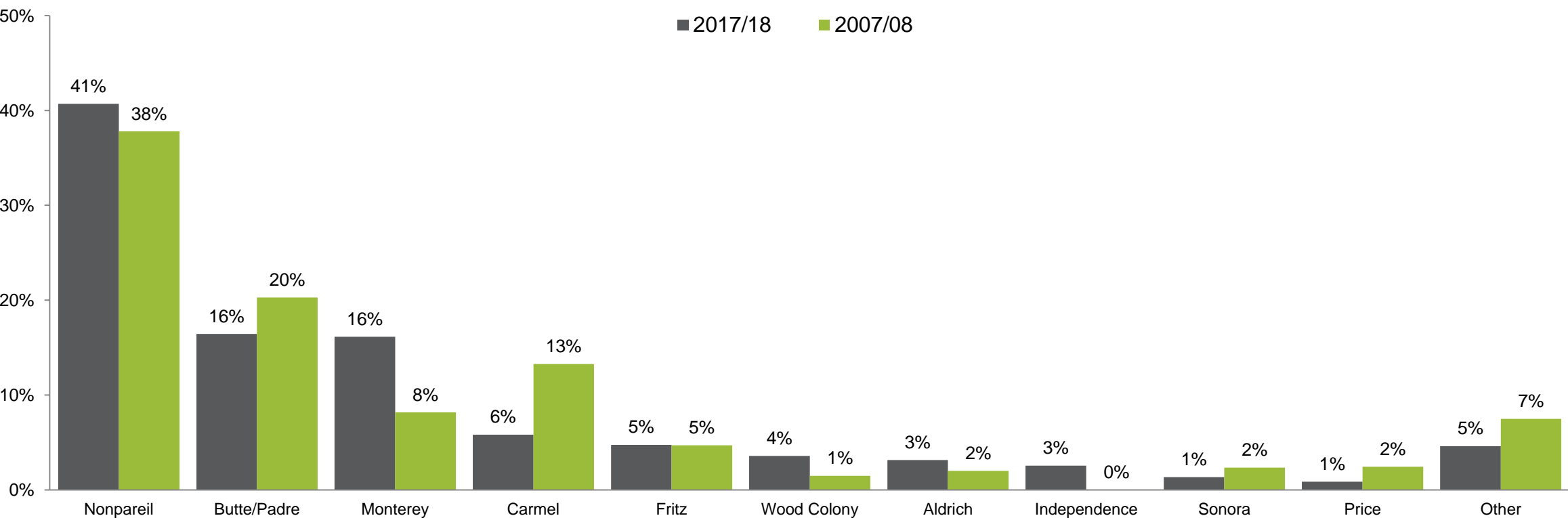






**NO variety fits all needs.....**

# Top 10 Almond Varieties



Source: USDA Incoming Receipts

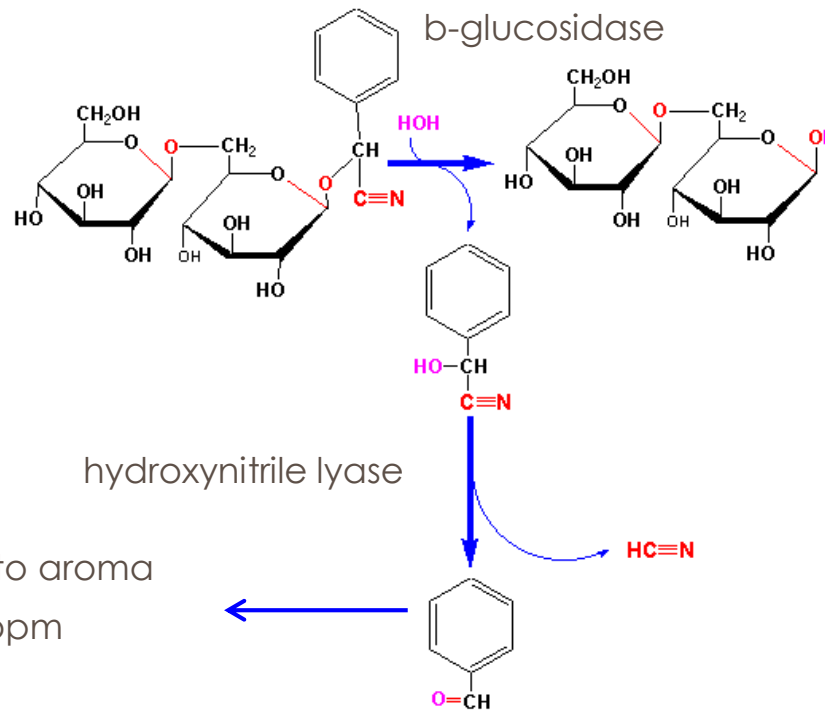
# Almond Variety Development Objectives

Agronomic	Commercial	Food Industry
High yields	Faster production, high yields	Good kernel quality and shelf life
Pest & Disease resistance	Varieties with low inputs for maintenance	Range of flavor based on application
Self fertile	Greater efficiency	Consistent kernel size and shape
Locally adapted	Improved pollinizers for Nonpareil	Textural integrity
Smaller trees with optimal tree architecture		
Consistent ripening		
Drought tolerant		

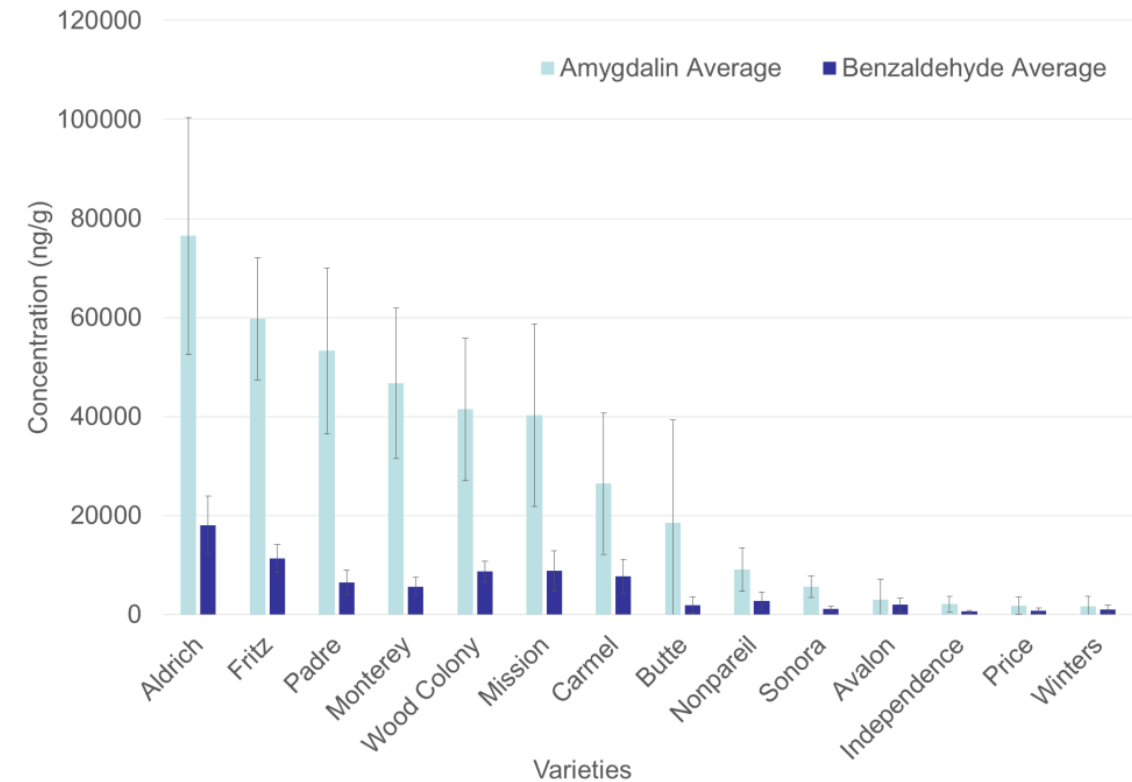
# Almond Flavor Volatiles and Sensory Properties

Benzaldehyde is generated by the disruption of almond tissue (e.g. chewing) which enables the amygdalin to come into contact with hydrolytic enzymes to form hydrogen cyanide and benzaldehyde

Amygladin = bitter



Benzaldehyde = amaretto aroma  
Odor Threshold = 0.5 ppm



- Amygdalin ranges between  $76.50 \pm 23.99$  -  $1.77 \pm 1.74$  mg/Kg
- Benzaldehyde ranges between  $17,995 \pm 5,887$  -  $587.7 \pm 272.9$  ng/g



# SELF INTRODUCTIONS AND COMPANY HISTORY

- **John Slaughter & Kaylan Roberts**, Burchell Nursery
- **Chuck Fleck**, Sierra Gold Nurseries
- **Grant Zaiger**, Zaiger Genetics
- **John Duarte**, Duarte Nursery
- **Mark Kline**, The Hershey Company





# **Almond Varieties: Production and Quality Attributes CPG Manufacturer Perspective**

Mark Kline, Sr. Manager, Nut & Energy Sourcing, Global Commodities

December 4<sup>th</sup>, 2018

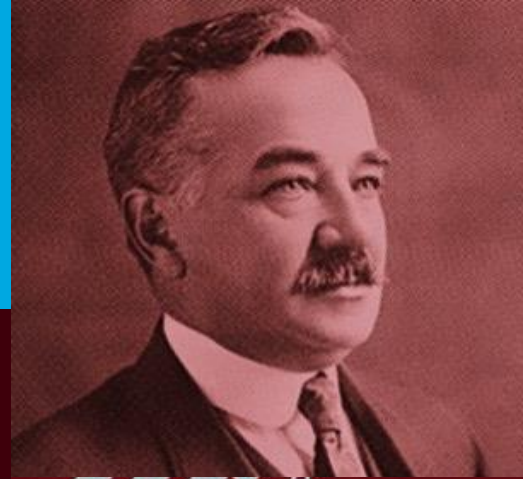
The Almond Conference





# THANK YOU ALMOND INDUSTRY!

Consumers have enjoyed  
Hershey's Milk Chocolate with  
Almonds for over 100 years.



# HERSHEY'S ALMOND PORTFOLIO





# Breeding and Varietal Selection:



- **Desired phenotypes are produced through breeding and selection.**
- **Manufacturers prefer narrow deviation from mean for desired quality attributes.**
- **Selection must work for industry and meet Consumer's need.**

# Hershey's Preferred Almond Requirements



- Flavor
- Shape
- Size
- Texture
- Grade



# INITIAL FLAVOR IS AS IMPORTANT AS FINAL SHELF-LIFE FLAVOR

Positive Attributes	Definitions
Almond	The nutty aromatic characteristic of roasted almonds
Roast/Toast	The aromatic associated with food items that have been browned by heat treatment

Negative Attributes	Definitions
Painty	The aromatic associated with aged fats or oils
Cardboard	The aromatic associated with wet cardboard; age, package, or process related.



# ICONIC BRANDS: CLASSIC FORMS





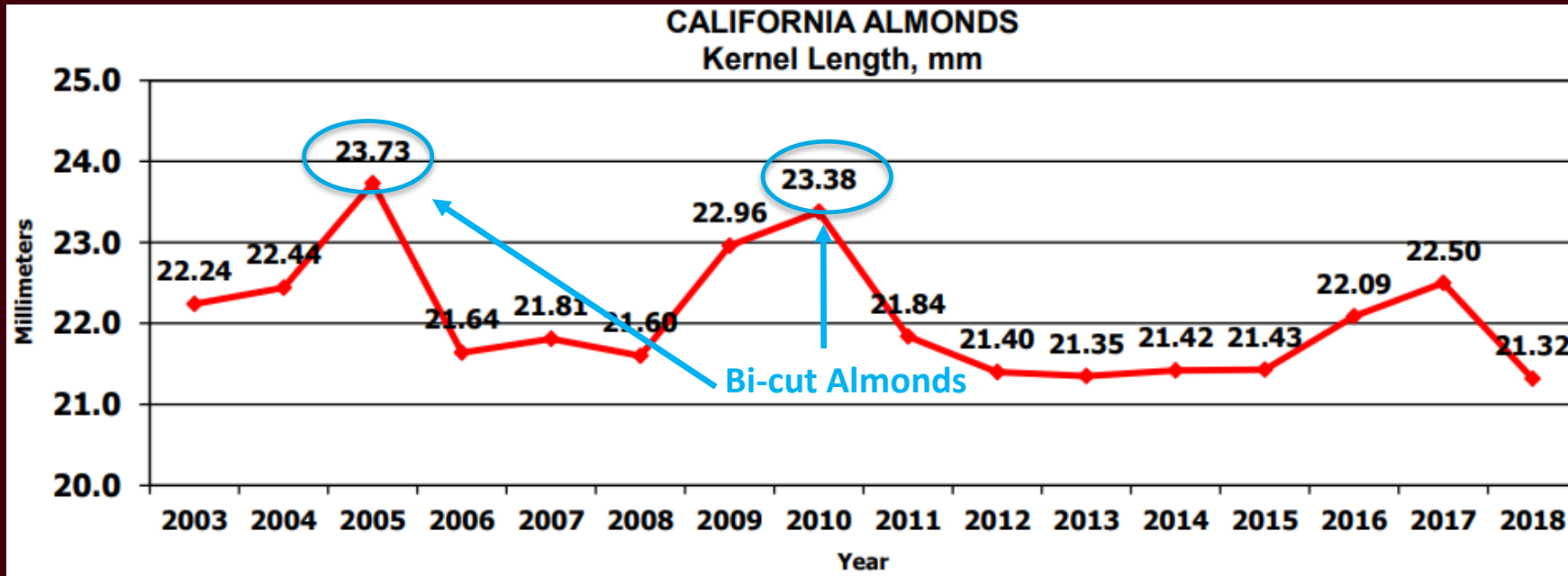
# ICONIC BRANDS: CONSUMERS FEEDBACK IS KEY



Transition to chopped almonds



# ICONIC BRANDS: CONSUMER FEEDBACK IS KEY



# HERSHEY ALMOND SIZING REQUIREMENTS

## 10 almond categories

- Chopped almond applications
- Whole almond applications
  - Size: 30/32 – 40/50 CPO
  - Dimensions:
    - Flat almonds – bar applications
    - Short almonds – molded applications



**MEETING CONSUMER NEEDS IS KEY  
TO DRIVING GROWTH**

Thank you!



# Sierra Gold Nurseries

Almond Trees for the Next Generation  
of Orchards







# Almond Trees for the Next Generation of Orchards

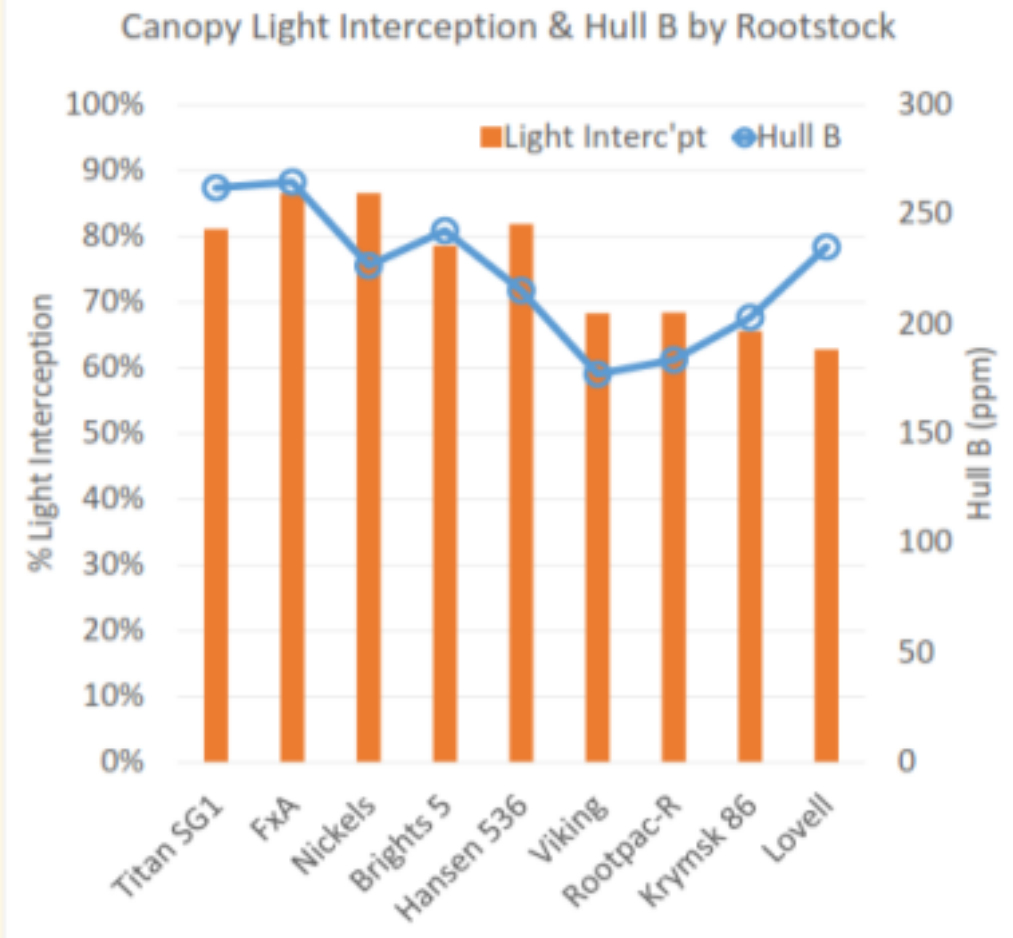
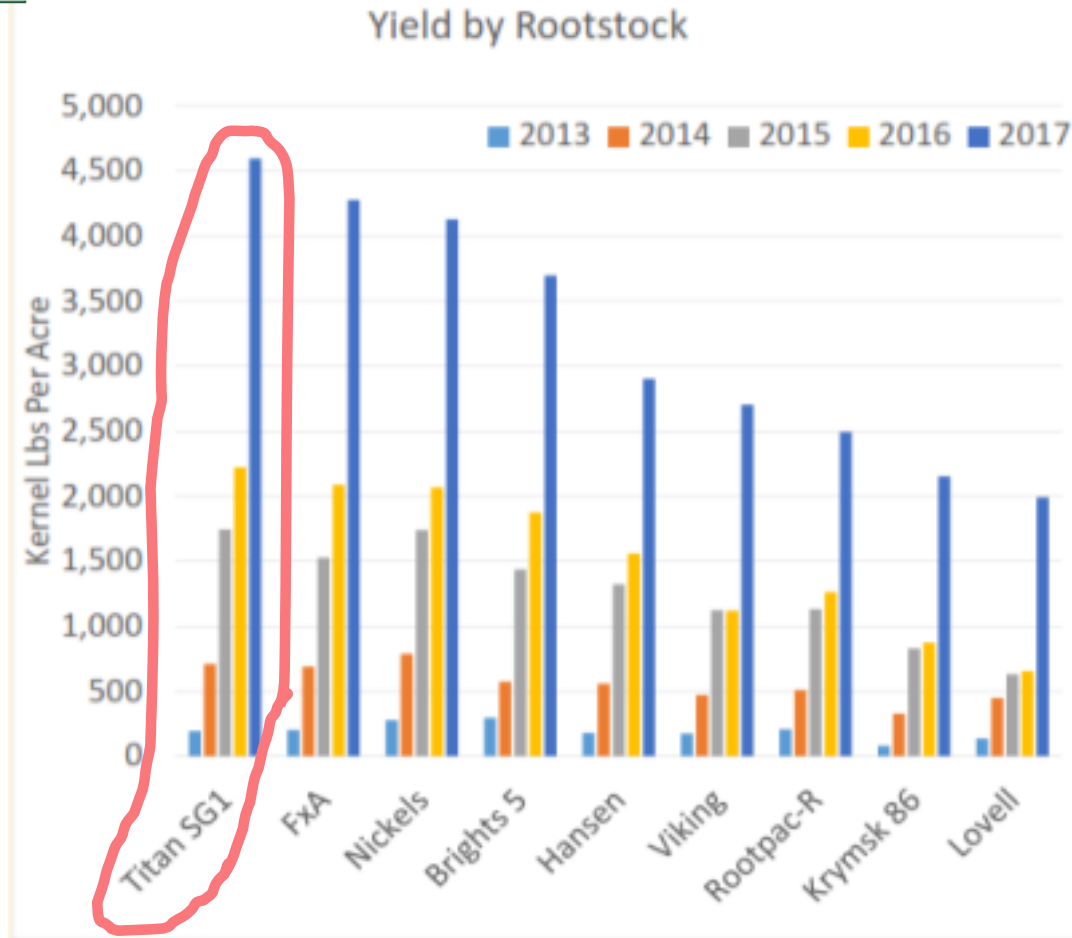
- Vigorous and Productive
- Multi-pest Resistant
- Adaptable to Local Conditions



# Almond Trees for the Next Generation of Orchards

## Titan SG1®

### Almond Rootstocks



## Superior Almond Yields & Boron Tolerance

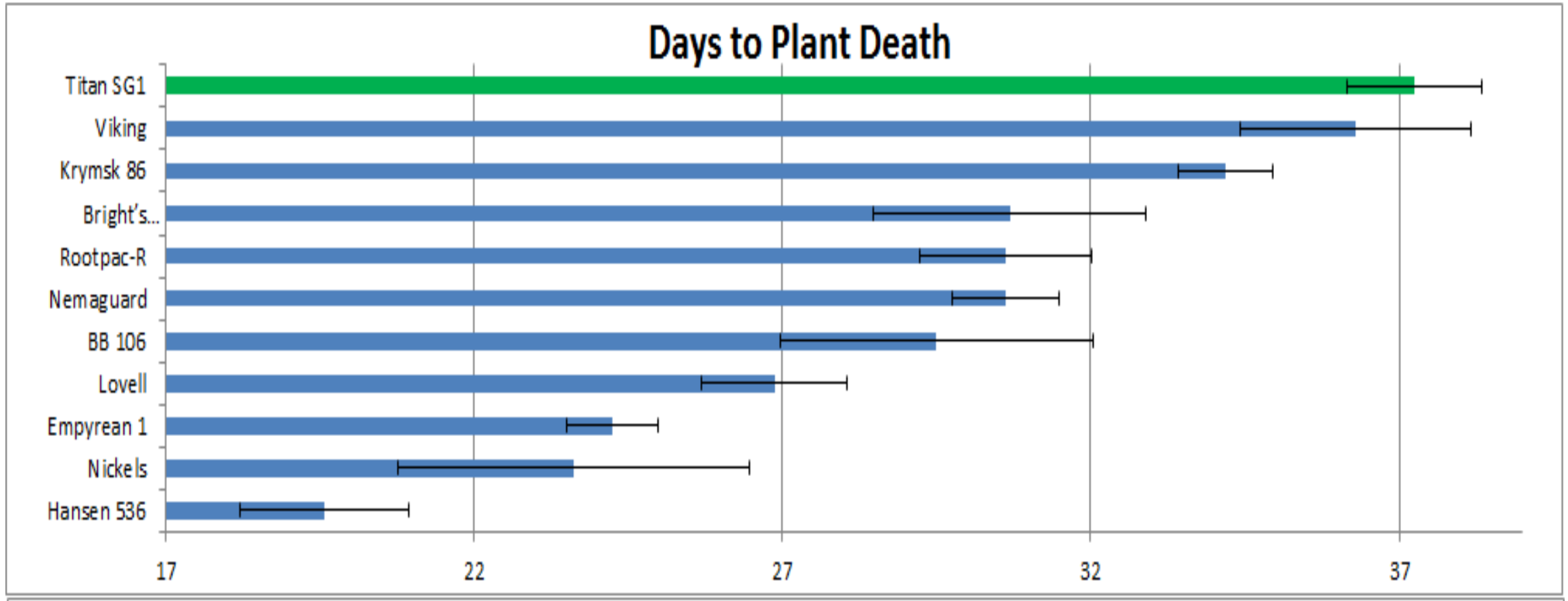
Katherine Jarvis-Shean, UCCE



# Almond Trees for the Next Generation of Orchards

## Titan SG1®

### Almond Rootstocks



## Superior Asphyxia Survival





# Almond Trees for the Next Generation of Orchards

## Titan SG1®

### Almond Rootstocks



Nonpareil/ Titan SG1®

Monterey/ Titan SG1®



# Almond Trees for the Next Generation of Orchards

## **Titan SG1®** Almond Rootstocks

- Advanced Clonal Selection Peach/Almond Hybrid
- Excellent Vigor
- Root Knot Nematode Resistant
- Well-Anchored Deep Rooting, and Drought Tolerance.
- Tolerates Boron, High pH Soils, and Salinity.
- Best performance is on Well-Drained Soils

# Almond Trees for the Next Generation of Orchards

## Almond Rootstocks

### Tolerance of Biotic Pests

- Nematodes



- Phytophthora



- Crown Gall



- Oak Root Fungus





# Almond Trees for the Next Generation of Orchards

## Almond Rootstocks

### Soil Environment Tolerance -

- Salinity



- Root Asphyxia



- Anchorage



- Boron





# Almond Trees for the Next Generation of Orchards

## Almond Scion Varieties

- Productivity

Tree Architecture, Vigor and Fruiting Habit

- Kernel Quality

Color, Texture, Size, Flavor, Low Doubles, Blanching, etc.

- Disease & Insect Tolerant

NOW, Rust, Scab, Hull Rot, *Botryosphaeria*, etc.

- Orchard Lifespan

Reduced Hedging and Heart-rots

# Almond Trees for the Next Generation of Orchards

## Almond Scion Variety Target Categories

- Self-Fruitful 'Nonpareil'



- Self-Fruitful 'Carmel'



- Self-Fruitful 'Sonora'



- Self-Fruitful 'Butte'



- Self-Fruitful 'Monterey'





# Almond Trees for the Next Generation of Orchards

## Almond Scion Variety Testing

- Australian SF Almond Varieties (University of Adelaide)



'Mira'



'Vela'



'Capella'



'Maxima' ->2g not SF

- Spanish Almond Varieties from (CIBAS)



'Penta'



'Makako'

# Almond Trees for the Next Generation of Orchards

## Almond Orchard Establishment

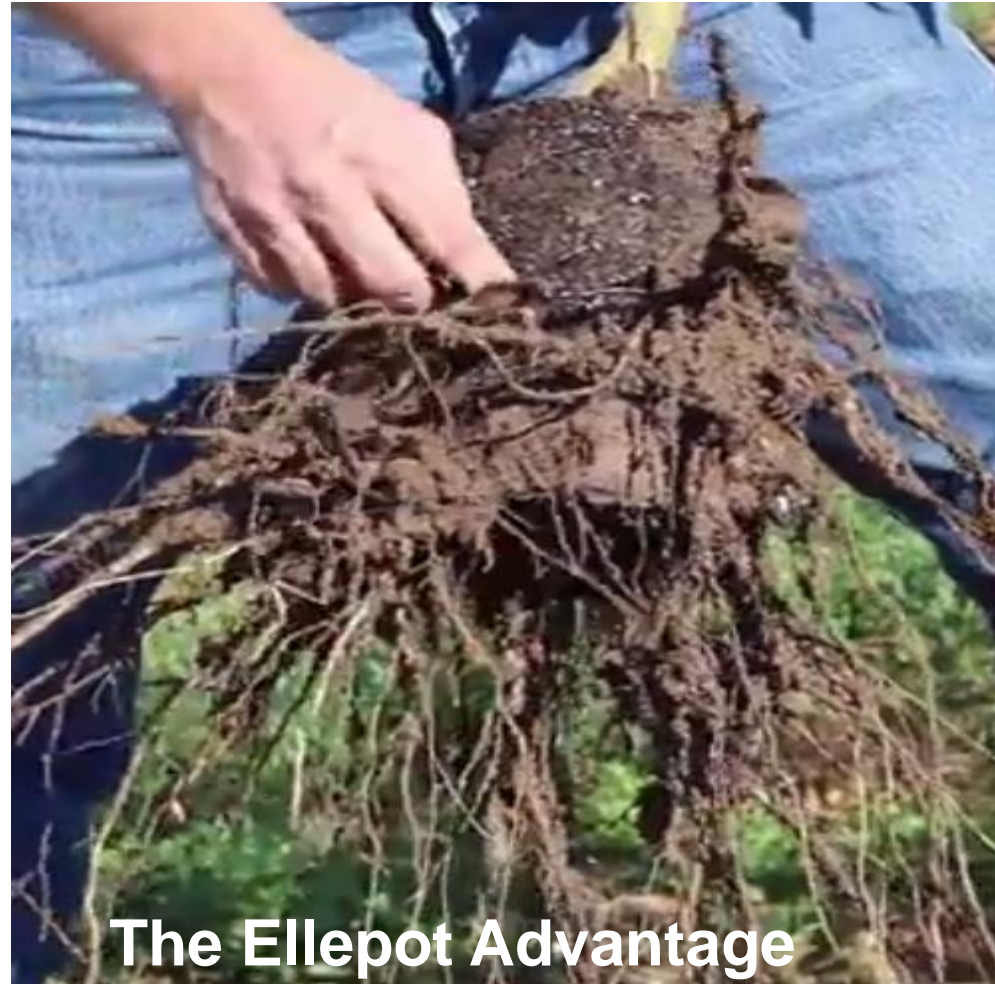
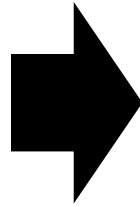
### Introducing our New JET™ Growing System



**The Ellepot Advantage**

# Almond Trees for the Next Generation of Orchards

## Almond Orchard Establishment



**The Ellepot Advantage**



# Sierra Gold Nurseries

Almond Trees for the Next Generation  
of Orchards

Thank You



# Grant Zaiger

Zaiger Genetics





# Bennett-Hickman

Presenter: John Duarte -President



# Variety Comparison

Bennett-Hickman

US PP26,083 P3



Nonpareil





**Bennett-Hickman**

US PP26,083 P3



**Nonpareil**



# Facts

- 34-day bloom time.
- Harvests 14 days after Nonpareil, (unlike Monterey).
- Release is outstanding.
- As of today, no graft incompatibilities.
- Strong seller in all almond growing areas.
- Of the recently, 1 million almond trees sold;
  - 85% is 50/50 Nonpareil, Bennett-Hickman

# Kernel Quality

- Identifies as Nearly Identical to Nonpareil
- Can be used the same ways a Nonpareil Kernel
- Roasts well
- Large and slightly darker than Nonpareil
- Crunchier and more flavorful than Nonpareil

# Yields and Profits

- Full stature tree, not quite as tall as Nonpareil.
- Thick branches.
- Dense nodes, profuse flowering.
- Produces 15-25% more than Nonpareil.
- Perfect Bloom coverage.
- Highest priced nut and higher production than Nonpareil.
- Same irrigation as Nonpareil with higher yield.



# Bennett-Hickman Branches and Nodes





# Bennett-Hickman Bloom

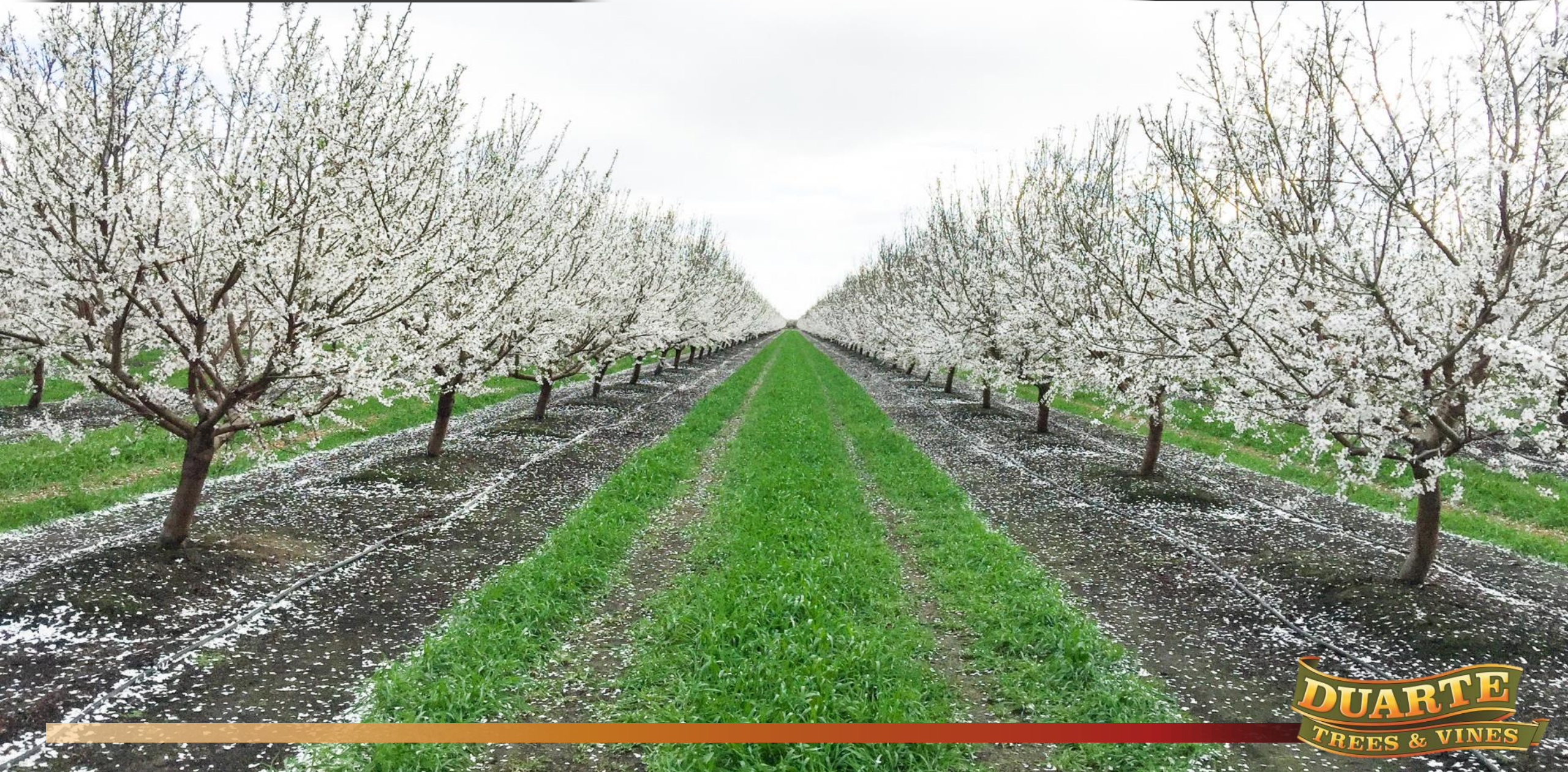


**DUARTE**  
TREES & VINES



Bennett-Hickman

Nonpareil



**DUARTE**  
TREES & VINES





Bennett-Hickman Production

**DUARTE**  
TREES & VINES





Bennett-Hickman Production

**DUARTE**  
TREES & VINES

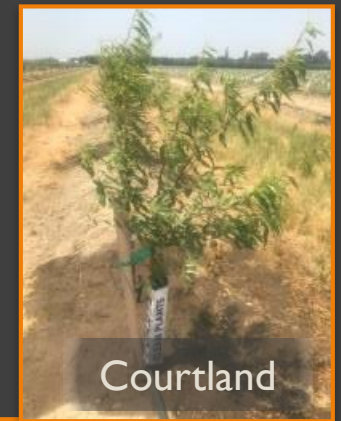




Dixon



Chico



Courtland



Turlock



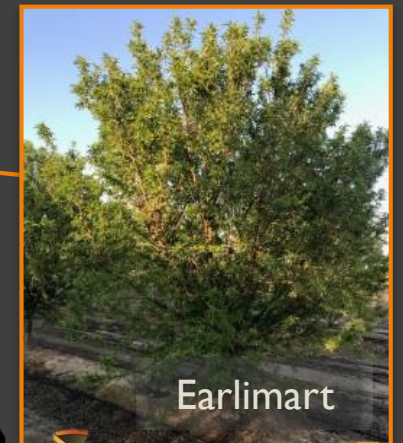
Modesto



Bakersfield



Kern County



Earlimart

**DUARTE**  
TREES & VINES

# Processors currently receiving Bennett Hickman as a Nonpareil type:

- Blue Diamond Growers
- Hilltop Ranch
- Hughson Nut Co.
- Famoso Nut Co.

# In the Field

- Very easy release
- Very clean shake
- No second shaking pass
- Light polling



# Bennett-Hickman Alleles Compatibility

100%

Monterey

Butte

Sonora

Fritz

Padre

Winters

50%

Nonpareil

Mission

Aldrich

Price

Ne Plus

Carmel

Livingston

Independence

0%

Wood Colony





The Experienced Source For California Almonds

## Bennett - Hickman

**Huller Turn Out:** 28.9%

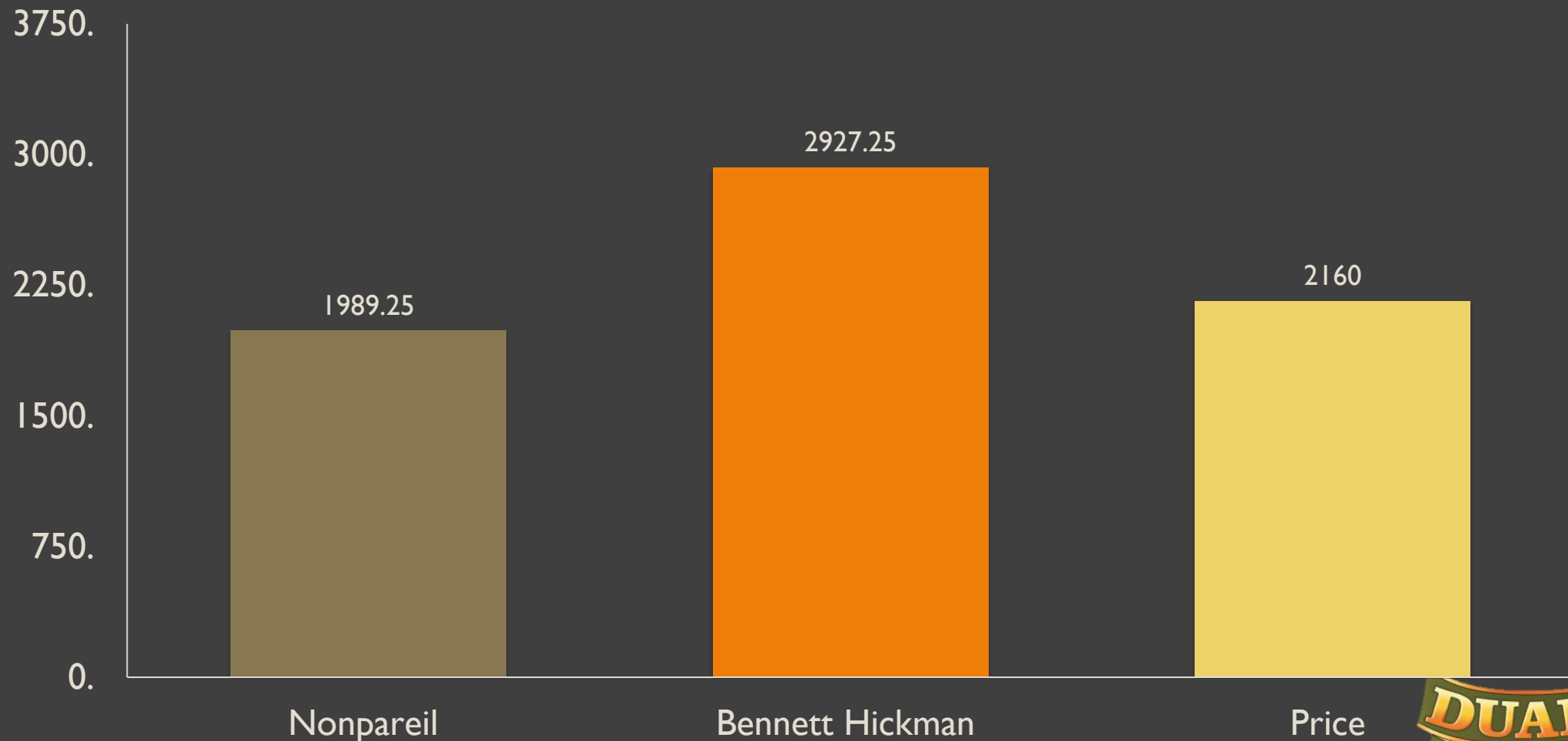
**Inshell Crack Out:** 71.0%

**% of Inshell vs. Meats:** 76%

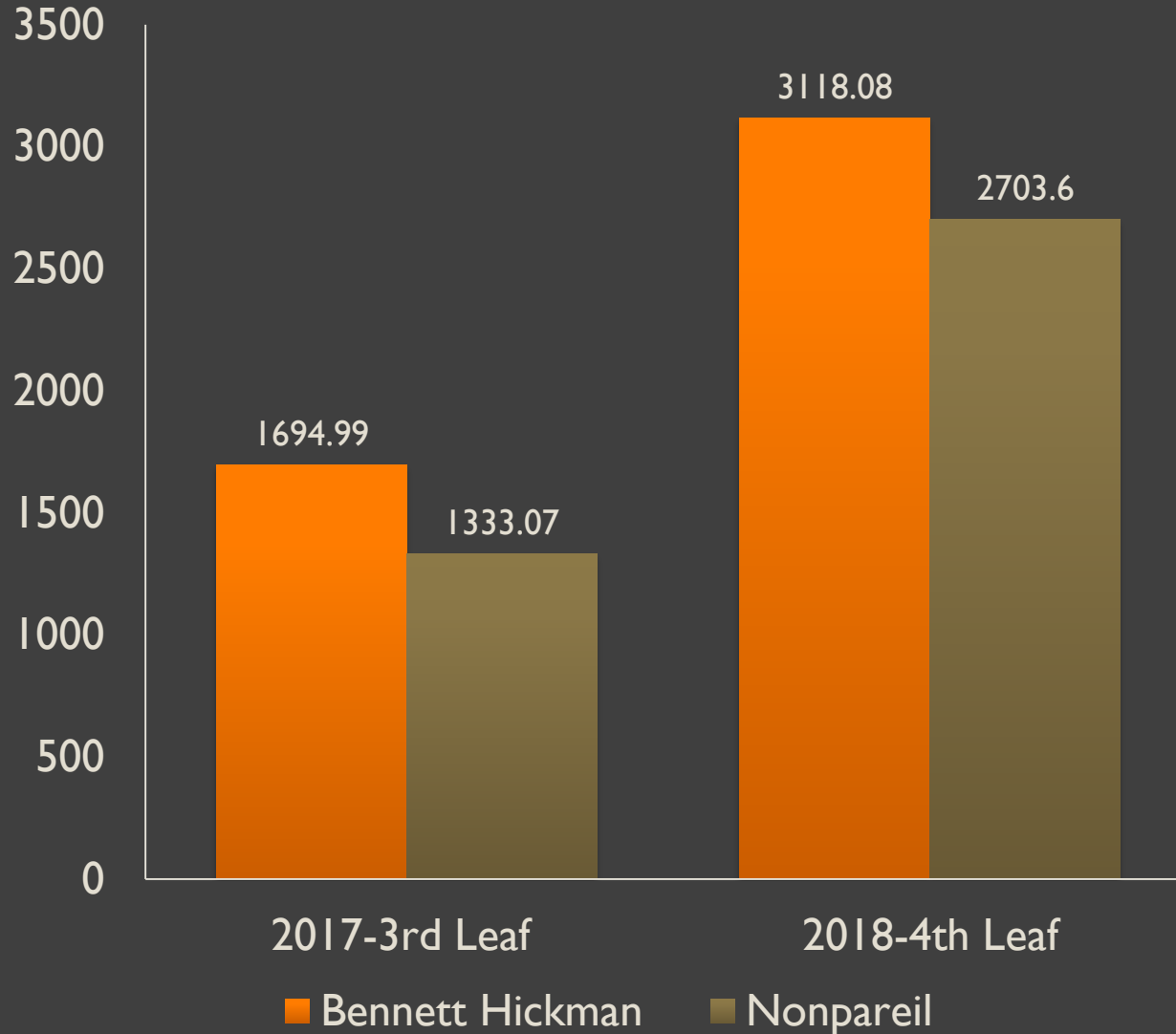
**Size:** 26.8

# Oldest Bennett Planting

Avg. Lbs/Ac Harvest from 2014-2017



# Scheuber Ranch Almond Lbs per Acre



- **Bennett-Hickman**

- Tree spacing: 16x21

- Total Trees: 2508

- Acres: 19.35

- **Nonpareil**

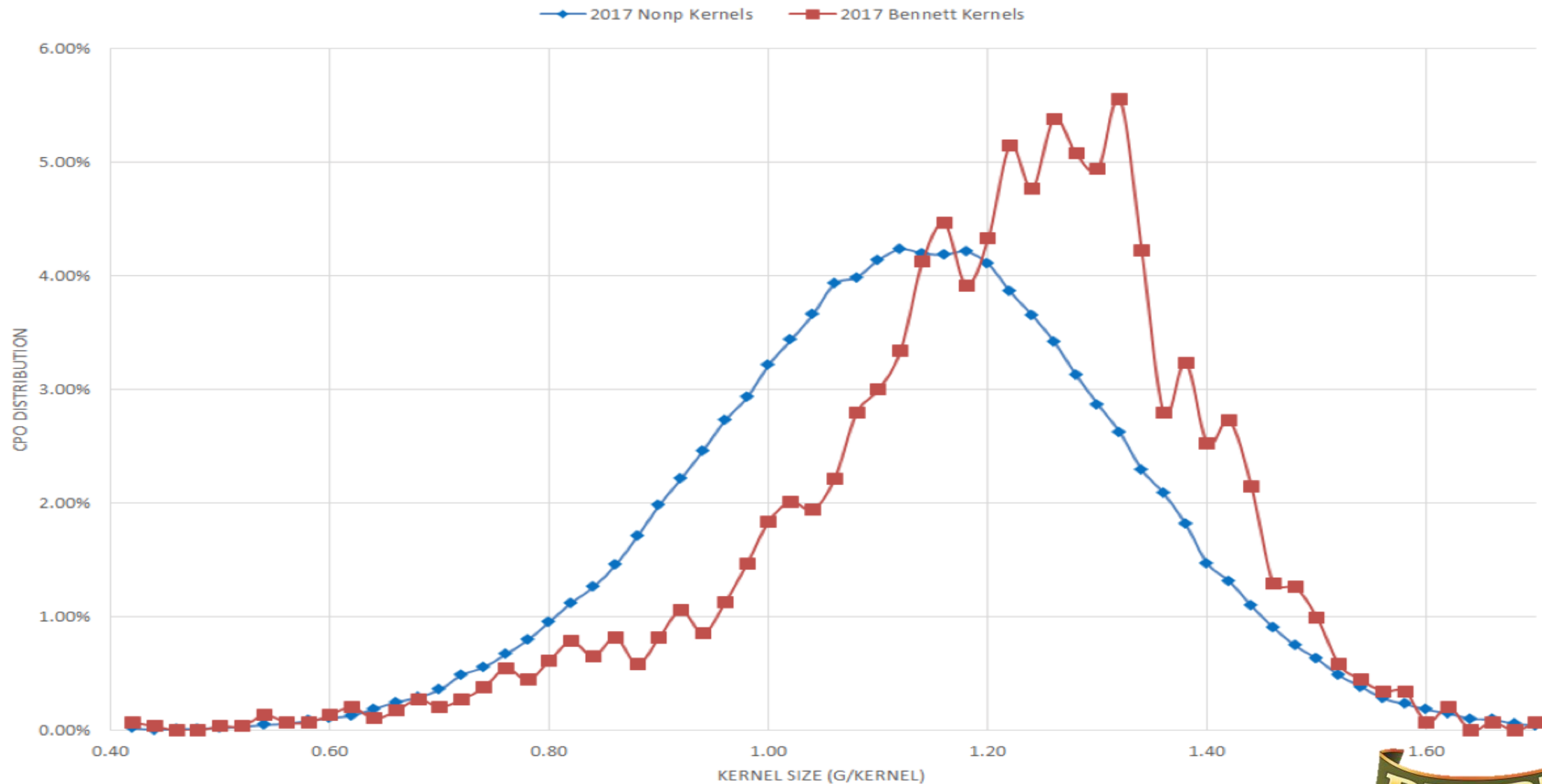
- Tree spacing: 16x 21

- Total Trees: 2341

- Acres: 18.05



## BENNETT VS NONP 2017 KERNEL SIZES





# It's Nearly Identical to Nonpareil

## Bennett-Hickman Variety Continues to Shine

At Duarte Nursery's Bennett-Hickman Field Day near Hughson, nearly 100 growers stood around and heard Jim Duarte announce that last year he harvested 1,700 pounds on three-year-old Bennett-Hickman trees from the Scheuber Ranch. Meanwhile, the Nonpareils, which are 50 percent of the orchard, were 37 percent less. In addition, Bennett-Hickman is commanding the Nonpareil price from almond processors.

Mel Machado, Director of Member Relations at Blue Diamond, stepped up with a processors point of view. "The standard answer on any variety is that it takes years to qualify it as a variety," he said. "You need data from several different areas. You can't decide from one sample or one orchard. You need it from all over the state – from Chico to Arvin."

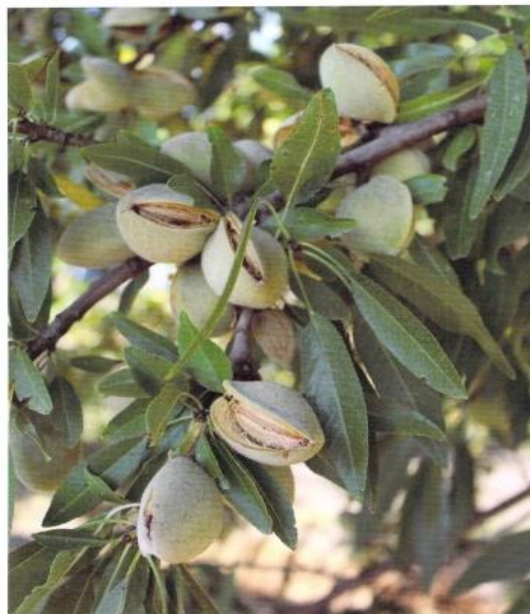
Regarding the Bennett-Hickman variety, Machado noted, "So far, so good. What I see at this point is that there is nothing in that variety that scares me and we are paying it at Nonpareil prices."

"We have received a few loads over the last couple years, and what we have seen in both the kernel and in-shell is that it's indistinguishable," Machado said. "It will be several years before we get that determination because we have only received loads from Stanislaus County, so we need to get the same from Kern and Butte before we know what is going on; but so far, it does look good."

"We told our growers who are planting it that we will pay the Nonpareil price for both inshell and kernel,"



John Duarte, Duarte Nursery & Rich Miller, Hilltop Ranch, addressing crowd at August Field Day



Bennett-Hickman variety in mid-August

said Rich Miller, Grower Relations Representative with Hilltop Ranch in Ballico. "We feel that it is a very strong lookalike to Nonpareil, and I think there is going to be a good spot for it in the industry. Bennett-Hickman is a blonde nut, which is appealing to a lot of markets, and it is aesthetically pleasing – an excellent looking kernel with great flavor. We've shown it to many international buyers, and it has been received very well. We are looking forward to getting it in."

Bennett-Hickman's bloom starts about a week earlier than Nonpareil and goes a week to 10 days after Nonpareil. The historical challenge for Nonpareil has been having a pollinizer that will pick up the beginning of Nonpareil and not bloom out and disappear before the Nonpareil is in full bloom, and still be a good producer. "Bennett-Hickman does both of those jobs," said John Duarte, President of Duarte Nursery. "We have had the wettest year in 20 years in 2017 and the worst frost year in 40 years this past winter.



Joe Bauman with Salida Ag Chemical

So, we have been able to pressure test it in a short amount of time."

"Over the last three to four years, I can tell you that the Bennett-Hickman is the same as Nonpareil," shared Joe Bauman with Salida Ag Chemical, and the PCA for the Scheuber Ranch. "We have kept up on our sprays here, but disease wise, no difference. Hull rot is the same as

Nonpareil, which is our number one issue in this field. Regarding fertility, Bauman said the Bennett-Hickman and Nonpareil block got 108 units of nitrogen went on as CAN-17 with a cutoff at the end of March or the first of April. "Depending on how you look at it, about 60 units got in with three-acre feet of water," he said. "We may have about



Jim Bennett, who discovered what is now the Bennett-Hickman variety

50 to 60 units of nitrogen from a previous compost application. For all the other nutrients, we carefully monitored and met the tree's needs."

Jim Bennett, who discovered the chance seedling on his almond operation at the base of a windmill in Hickman, addressed the crowd. "I experimented with this variety with my kids for more than 20 years because I wanted to prove it to myself before I did anything else with it. My first planting was 19 years ago when I put in 25 trees on rootstock, and those trees are doing well."

Later he planted trees every fourth row and then developed another 10 acres with the variety planted every other row with Nonpareil. "On my latest planting a few months ago, instead of going 1:1 Nonpareil and Bennett, I went two rows Bennett and one Nonpareil. Those trees are doing very well too," he said.

PNP

Visit our booth # 1033 at the Almond Conference, December 4-6, 2018

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**All The Best Rootstocks**

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Oct. 2018 Volume 32 No. 10

**PNP**

**PACIFIC NUT PRODUCER**

**DUARTE**

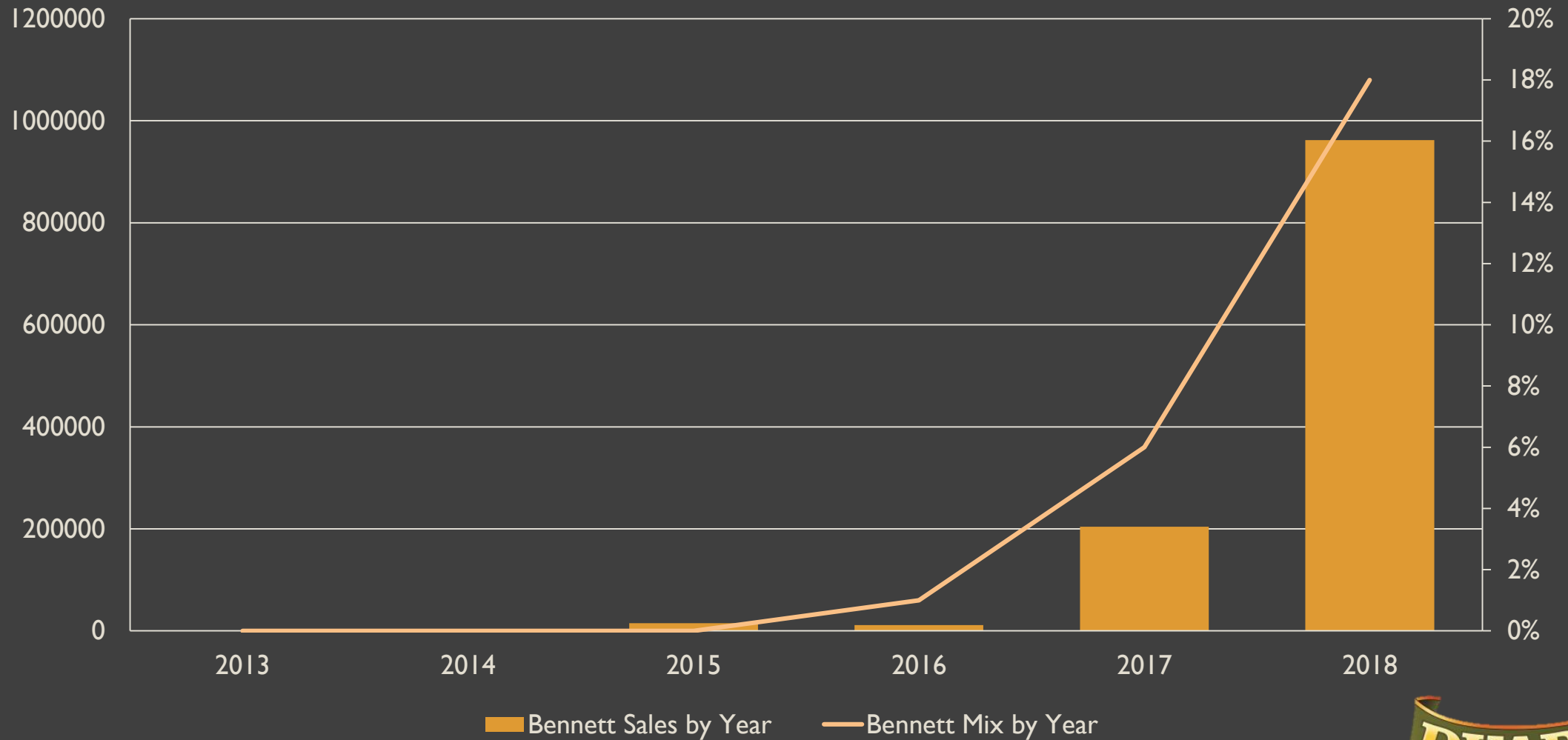
**TREES & VINES**



# Risk Mitigation

- Modesto planting observations:
  - 2018: Bennett-Hickman 15% more buds than Nonpareil (after severe frost year).
  - 2017: Pollination was excellent with very wet bloom period.

# Sales and Trend





# Bennett-Hickman Availability

- Duarte Nursery is the exclusive seller
- Bennett-Hickman is available for 2019





# Bennett

Bennett-Hickman US PP26,083 H3  
New Almond Variety

August 16<sup>th</sup>, 2019

Tours · Presentations · Lunch

Field Day

9AM - 11AM  
631 Service Rd.,  
Modesto, CA

RSVP by August 2nd  
[marketing@duartenursery.com](mailto:marketing@duartenursery.com)  
209-531-0351

 Find us on Facebook

**DUARTE**  
TREES & VINES

*Field Day!*

## You're Invited

22<sup>ND</sup> ANNUAL

# FRIENDS DAY

FRIDAY, MAY 3<sup>RD</sup>, 2019 | 9 a.m. - 2 p.m.



TOURS • TRADE SHOW • LUNCH

  
Clean, Clonal, Containerized

**1-800-GRAFTED**  
1555 Baldwin Rd.  
Hughson, CA 95326

RSVP to [events@duartenursery.com](mailto:events@duartenursery.com)



# What's Next

## **Tuesday, December 4 at 12:00 p.m.**

- Almond Breeding: Is There a Role for New Genetic Technologies? – Room 312-313
- FSMA Scorecard: How Does Your Operation Stack Up? – Room 306-307
- Speed Talks: Nutrient, Salinity and Soil Health – Room 308-309

## **Tuesday, December 4 at 12:30 p.m.**

- Almonds in the Global Marketplace – Room 314



**Join the social media  
conversation at  
#AlmondConf**



# What's Next

**Tuesday, December 4**

- State of the Industry – Hall C at 4:15 p.m.

*Be sure to join us at 5:30 p.m. in Hall A+B for Dedicated Trade Show Time and Opening Reception, sponsored by FMC Agricultural Solutions*

# FMC