

North San Joaquin Valley Almond Day

Sponsored by UC Cooperative Extension

Coffee, donuts & snacks provided by:

Yosemite Ag Credit

Cumulative Chilling Hours

Nov. 1, 2010 - January 17, 2011

	2009-10	2010-11	Average
Modesto	686	793	778
Patterson	561	618	596
Oakdale	726	761	729

Considerations When Selecting Almond Varieties

Roger Duncan

UC Cooperative Extension
Stanislaus County





★ **Chico**

★ **Manteca**

★ **Bakersfield**

**California from Afar ---
courtesy Dr. William
Bowen, CSU Northridge**

Data collection --- Regional Variety Trials

- Time of bloom & bloom weather
- Pest & disease susceptibility
- Bud Failure (genetic)
- Hull split and harvest maturity
- Productivity...yield data
- Nut quality (double kernels, shell seal, rejects)



Additional information desired:

- Pollen incompatibility groups
- Blanch ability & Marketing group (value)
- Scion compatibility on Marianna 2624 plum rootstock

There is no such thing as a
perfect variety

Growers must take many factors into consideration
when making their choice

First choose main variety:

- Nonpareil or Butte (or something else)
- Choose appropriate pollinator(s)

Almond Variety Choice Depends on:

- Yield

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- Price

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- Yield
 - Price
- } Gross income

Statewide Average Yield Comparison for Nonpareil vs. Butte & Padre (lbs / acre)*

*based on Almond Board of California Almanac

	2000	2001	2002	2003	2004	2006	2007	2008	2009	Avg.
NP	1425	1613	2267	1927	1853	2333	2539	2486	2103	2061
Butte & Padre	1563	1912	2441	2689	2296	1775	2433	2506	2281	2211

Butte & Padre has produced 150 lb. per acre more
than Nonpareil on average

Price per Pound for Nonpareil vs. Butte & Padre Paid by Blue Diamond Growers*

*Does not include premiums for quality or volume

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
NP	\$1.01	\$1.01	\$1.28	\$1.69	\$2.39	\$3.08	\$2.25	\$1.99	\$1.78	\$1.94
Butte & Padre	\$0.79	\$0.86	\$1.05	\$1.50	\$2.16	\$2.75	\$1.90	\$1.54	\$1.17	\$1.30
Diff	\$0.22	\$0.15	\$0.23	\$0.19	\$0.23	\$0.33	\$0.35	\$0.45	\$0.61	\$0.64

Average Gross Income for Nonpareil vs. Butte & Padre*

*based on Almond Board of California Almanac and Blue Diamond Pay Schedule

	2000	2001	2002	2003	2004	2006	2007	2008	2009	Avg.
NP	\$1553	\$1694	\$2924	\$3372	\$4466	\$5319	\$5078	\$4425	\$4080	\$3657
Butte & Padre	\$1375	\$1683	\$2587	\$4141	\$5005	\$3408	\$3771	\$2932	\$2965	\$3096
	+\$178	+\$11	+\$337	-\$769	-\$539	+\$1911	+\$1307	+\$1493	+\$1115	+\$561

Variety Classification

- Nonpareil inshell \$1.98
- Sonora inshell \$1.94
- Nonpareil meats \$1.94
- Sonora Meats \$1.58
- Carmel \$1.47
- Monterey \$1.39
- California \$1.33
- Butte / Padre \$1.30
- Mission \$1.25
- Neplus \$1.21

Average Yield per Acre for the Most Commonly Planted Varieties

	2009	2008
Nonpareil	2103	2486
Carmel	1643	2259
Butte / Padre	2281	2506
Monterey	2127	2615
Fritz	1979	2559
Price	1491	1981
Sonora	1614	2004
Aldrich	1995	2868

Almond Variety Choice Depends on:

- Yield
 - Price
- } Gross income
- Bloom time (overlap with main variety)

Bloom Time ---

Early

Jordanolo
NePlus Ultra
Sonora

Early-mid

Winters
Peerless
Rosetta
Avalon

Mid

Aldrich
Price
Fritz
Solano
Nonpareil
Carmel
Wood Colony
Sauret #1
Merced



Bloom Time ---

Mid-Late

**Butte
Carrion
LeGrand
Monterey
Norman
Sauret #2
Tokyo**

Late

**Livingston
Padre
Mono
Thompson
Mission
Ruby**

Very Late

**Planada
Ripon
Savana
Morley**



Full Bloom Time Relative to Nonpareil*

*Data taken from Butte County
Variety Trial:

average of 1996 – 2003

Fritz not included in Chico trial



Sonora	-6.4
Sano	- 5.3
Winters	- 3.4
Donna	- 3.3
Aldrich	- 1.4
Jenette	- 0.8
Price	+ 0.4
Carmel	+ 1.4
Wood Colony	+ 1.4
Monterey	+ 1.9
Plateau	+ 2.8
Butte	+ 4.3
2-19E	+ 4.4
Padre	+ 5.1
Livingston	+ 5.6
Mission	+ 6.1
Ruby	+ 9.8

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*Data taken from Butte County
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average of 1996 – 2003

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Almond Variety Choice Depends on:

- Yield } Gross income
- Price }
- Bloom time (overlap with main variety)
- Harvest date

Date of Harvest

- Harvest date may be an issue depending on:
 - Location / climate
 - Soil
 - Irrigation method
 - Other crops farmed
 - Equipment

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 - Location / climate
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 - Equipment
- Some varieties may harvest too late
 - Fritz
 - Monterey

Date of Harvest

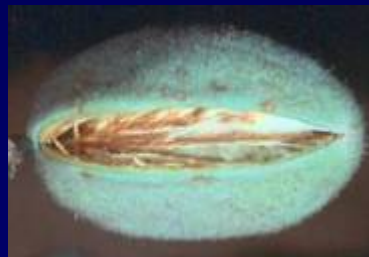
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 - Location / climate
 - Soil
 - Irrigation method
 - Other crops farmed
 - Equipment
- Some varieties may harvest too late
 - Fritz
 - Monterey
- Some varieties may harvest too soon after Nonpareil
 - Price, maybe Sonora (no time to irrigate between harvests)

100% hull split --- categorized by # days before or after 100% Nonpareil hull split

Kapareil Group 10 days before Nonpareil	Sonora Group 7 to 13 days after Nonpareil	Price Group 15 to 21 days after Nonpareil	Butte Group 23 to 28 days after Nonpareil	Carmel Group 29 to 34 days after Nonpareil	Mission Group 39 to 40 days after Nonpareil
Kapareil	Kochi* Sonora UC 2-19E Rosetta Jiml UC 1 - 102W* UC 2 - 43W* Johlyn UC 25-75	Donna UC 1-87 Price Jenette Morley Plateau	Yokut Wood Colony Livingston Sano Durango* Aldrich Padre Butte Chips	Savana Winters (UC 13-1) Carmel Avalon* Kahl Ruby	Monterey Mission

* Rankings of these cultivars are based only on 4 years of harvest maturity observations.

After 100%
hull split...
nuts are
harvestable



Almond Variety Choice Depends on:

- Yield } Gross income
- Price }
- Bloom time (overlap with main variety)
- Harvest date
- Insect pressure

Varietal Susceptibility to Worms

Percent Worm Infestation*	
Kapareil	34%
Plateau	24%
Butte	14%
Sonora	10%
Livingston	10%
Carmel	10%
Price	8%
Fritz	8%
Aldrich	8%
Monterey	8%
Winters	6%

*Kern County Variety Trial, 2003

-23 varieties in Kern trial had 6% or more worm damage

- Only 2 varieties had 6% or more worm damage at Delta College trial (Manteca)



Almond Variety Choice Depends on:

- Yield } Gross income
- Price }
- Bloom time (overlap with main variety)
- Harvest date
- Insect pressure
- Disease pressure

Disease Pressure

- Disease outbreaks are often related to location within the state or microclimate within a county:
 - Bloom time diseases tend to be worse in the Sacramento Valley due to high rainfall
 - Summer diseases like *Alternaria* are worse in the Southern San Joaquin Valley and Northern Sacramento Valley due to high temperatures and less air movement

Disease Pressure – Alternaria*

Variety	Percent Defoliation
Wood Colony	85
Carmel	80
Nonpareil	80
Sonora	70
Livingston	70
Monterey	60
Winters	60
Butte	60
Price	50
Fritz	50
Aldrich	30
Ruby	20
Padre	0

*Kern County Variety Trial 2003



Diseases noted that stand out ---

Rhizopus Hull Rot

Nonpareil
Kapareil
Johlyn
Kochi
Winters

Leaf Blight

Mission
Padre
Nonpareil
Rosetta
Aldrich
Jiml
Carmel
Wood Colony
Yokut

Anthracnose

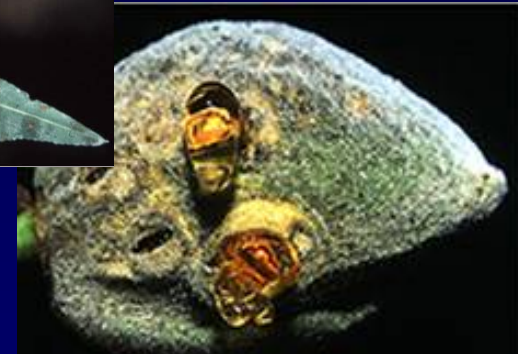
Winters
Peerless
Monterey
Wood Colony
Fritz
Price
Ruby

Scab

Sonora
Carmel
Sano
Winters
Peerless
Yokut
Johlyn
Nonpareil

Alternaria Leaf Spot

Aldrich Butte
Winters Donna
Livingston Jiml
Monterey
Sonora
Wood Colony



Almond Variety Choice Depends on:

- Yield } Gross income
- Price }
- Bloom time (overlap with main variety)
- Harvest date
- Insect pressure
- Disease pressure
- Kernel quality
- Size of farming operation

Size of Farming Operation

- If you farm several hundred acres or more, you may want to plant many varieties to spread out cultural operations like bloom sprays and harvest
- Small growers without equipment:
 - Minimize number of varieties
 - Grow varieties that can be harvested together or at the same time
 - Aldrich, Winters, Carmel
 - Butte / Padre
 - Independence
 - Grow what your neighbor has to share equipment

Economics of Single Harvest Orchards vs. Multiple Harvest Orchards

- Butte / Padre, Independence, etc.
 - Save ~ 20% on sweeper costs
 - Save ~ 30- 40% on pickup costs (+ set up fee)
- Sweeping $\$60 \times 20\% = \12
- Pickup $\$100 \times 40\% = \40
- Save ~ $\$60$ / acre in harvest costs

*Thank you Doug Flora

The Influence of Variety Arrangement on Yield.

Modesto Junior College Trial

Nonpareil Yield (pounds / acre)

	2003 4 th leaf	2004 5 th leaf	2005 6 th leaf	2007 8 th leaf	2008 9 th leaf	2010 11 th leaf	Cum	% Diff
N:C solid rows	1210	1914	1387	4317	3546	3092	15,466	--
N:C:M solid rows	1067 -12%	2233 +17%	1536 +12%	4568 +5.8%	4013 +13%	2893 -6%	16,310	+5.5%
N:C alternating	1496 +24%	1980 +3.4%	1541 +11%	4348 +0.7%	3824 +7.8%	3561 +15%	16,750	+8.3%

Economics of Single Harvest Orchards vs. Multiple Harvest Orchards

- Alternating two varieties down the same row increases sweeper costs by ~ 80% (~ \$45)
- Three or four varieties does not increase harvest costs over two varieties
 - Exception: set up fees (or your own transport costs)

*Thank you Doug Flora

Almond Variety Choice Depends on:

- Yield } Gross income
- Price }
- Bloom time (overlap with main variety)
- Harvest date
- Insect pressure
- Disease pressure
- Kernel quality
- Size of farming operation
- Farming style / personal preference
- Are you a risk taker?

“New” Varieties

- Winters, 2-19E, Sweetheart, Avalon, Durango, Folsom, Independence, Kochi, Marcona, Supareil, Bluegum
- Planting a new variety represents a risk
- Is potential return worth the risk?

Pollen Incompatible Groups ---

Nonpareil

IXL
Jeffries*
Long IXL
Grace
Profuse
Tardy Non

Solano

Eureka
Jeffries*
Kapareil
Vesta
Sonora

NePlus Ultra

Merced
Jenette
Norman
Price
Ripon
Rosetta
Aldrich
Pearl

Thompson

Granada
Harvey
Mono
Robson
Sauret #2
Le Grand
Wood Colony
Durango

Carmel

Livingston
Carrion
Jeffries*
Sauret #1
Monarch

Monterey

Monterey
Butte
Avalon
Plateau
Dottie Won

Peerless

Fritz
Ruby

Padre

Winters

Jordanolo

Tuono

Mission

Ballico
Languedoc

Tokyo

*Jeffries possesses unilateral incompatibility (a special case).

Almond Variety Choice Depends on Many Things:

- Yield } Gross income
- Price }
- Bloom time (overlap with main variety)
- Harvest date
- Insect pressure
- Disease pressure
- Kernel quality
- Size of farming operation
- Farming style / personal preference
- Are you a risk taker?

Finally,

Talk to sellers / marketers