



**INNOVATIVE
PROSPECTS:
*OLIVE OIL IN
CALIFORNIA***

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Presentation Outline

- What is happening in California / world
- California orchards and oils
- Mechanical harvest & continuous processing
- UC research & education



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California Olive Production

Making Money

- **Must have basic resource**
 - Land, water, climate, labor
- **Must have competitive costs**
 - Lower labor rates
 - Mechanization
- **Must have competitive yield**
 - Reduce alternate bearing
- **Must produce excellent quality and sell it**
 - Value to the consumer

Olive Oil - Keys to Success

- Mechanical Harvest (low labor cost)
- Continuous Flow Processing
- Big Growing Market

Mediterranean

- Infrastructure
- Lower Costs Sometimes
- Subsidy
- Huge market

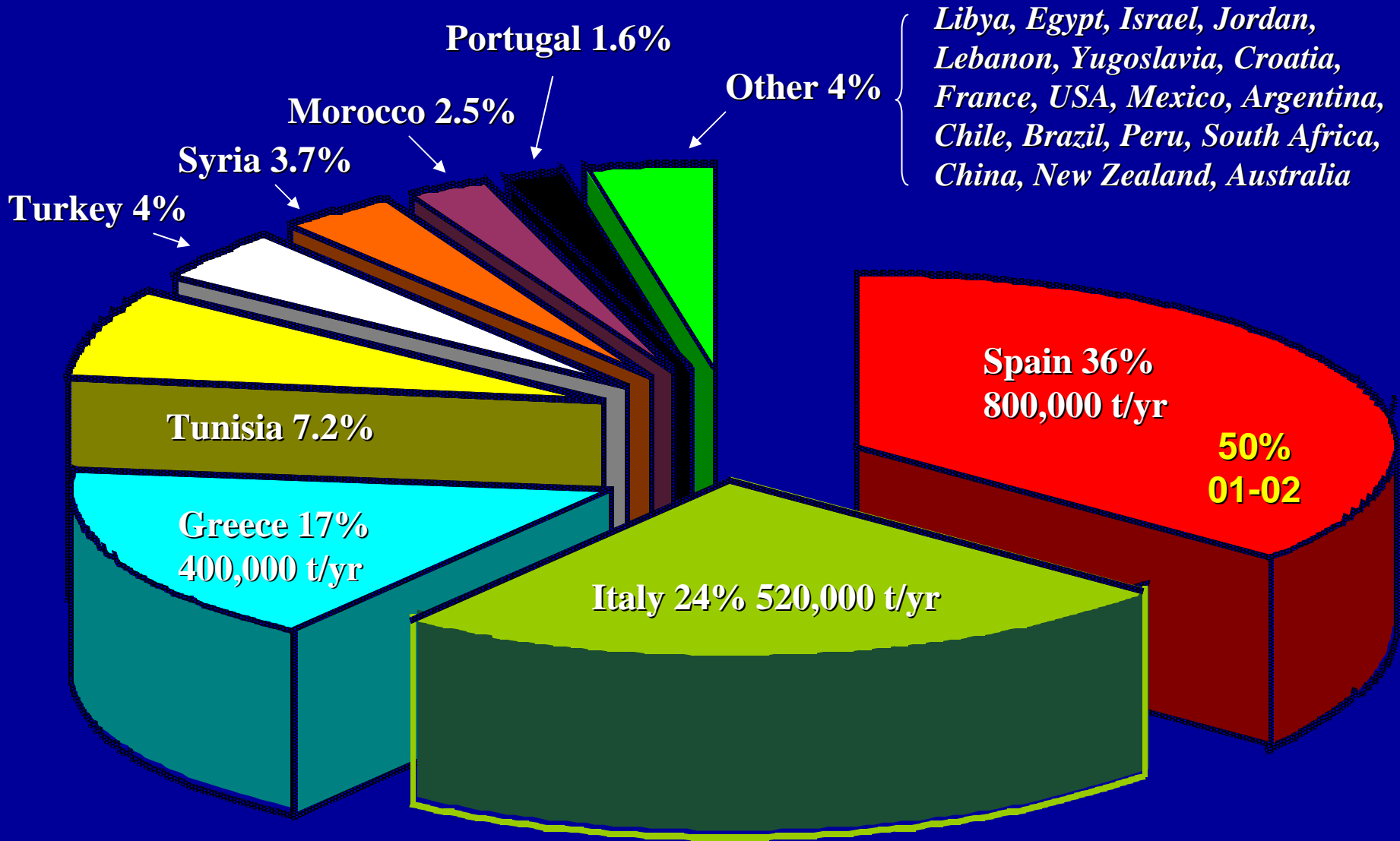


WORLD OLIVE ACREAGE

- Spain ~ 6 million **25%**
- Tunisia ~ 3.8 million **16%**
- Italy ~ 3.5 million **15%**
- Greece 2.5 million **11%**
- Portugal 1.3 million **6%**
- Turkey 1.2 million **5%**
- Morocco 1.1 million **5%**
- Syria 1.0 million **5%**
- Argentina 245,000 **1%**
- Australia ~ 100,000 **0.4%**
- **USA** ~ 28,000 **table** **0.11%**
~ 14,000 **oil** **0.05%**
- **World ~ 23.3 million**

*Plantings increasing in Europe, North Africa, and new world
SHD in 1994 = 15 acres - 2006 = 90,000 acres*

WORLD OLIVE OIL PRODUCTION



Total World Production: ~ 2.2 million metric t/yr

IOOC Data 1997-2002

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**Trunk
shaker
and
inverted
umbrella
WRAP
AROUND**



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Small scale production – fantastic quality



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Morocco – Antique Technology





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REFINING OLIVE OIL

What to do with crude pomace oil, rancid oil, or oil from rotten olives



Neutralizing



Washing



Odor Removal



Color Removal



Olive pomace being loaded into a hopper at an olive pomace refinery



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SUPERMARKET OILS



sugars, vitamin A, vitamin C, calcium, and iron.
* Percent Daily Values are based on a 2,000 calorie diet.
Packed in Italy with select oils from Italy, Spain, Greece and Tunisia.

Evolution of World Olive Oil Production and Consumption + USA Consumption (1,000 metric tons)

PRODUCTION

WORLD

- 1990/91 – 1,450
 - 1995/96 – 1,740
 - 1996/97 – 2,600
 - 2003/04 – 3,170
 - 2004/05 – 3,000
 - 2005/06 – 2,580
- + 90%

CONSUMPTION

WORLD

- 1990/91 – 1,670
- 1995/96 – 1,890
- 1996/97 – 2,240
- 2003/04 – 2,890
- 2004/05 – 2,890
- 2005/06 – 2,770

+ 65%

USA

- 88.8
 - 101.0
 - 130.5
 - 216.5
 - 217.0
 - 219.0
- +146%

Olive Oil Consumption 2006

World PER CAPITA (liters)

1. Greece 23.9	13. France 1.6
2. Italy 14.4	14. Libya 1.6
3. Spain 13.9	15. Australia 1.6
4. Cyprus 10.3	16. Algeria 1.4
5. Portugal 6.0	17. Lebanon 1.3
6. Syria 5.1	18. Belgium 1.2
7. Tunisia 5.0	19. Croatia 1.1
8. Palestine 3.5	20. UK 1.1
9. Jordan 3.1	21. Netherlands 0.8
10. Israel 2.6	22. Canada 0.8
11. Morocco 1.8	23. Turkey 0.7
12. Luxemborg 1.7	24. USA 0.7

By Country

- Italy 30%
- Spain 20%
- Greece 9%
- **USA 8%**
- France 4%
- Syria 3%
- Other 26%

Mediterranean Diet Pyramid

Daily Beverage Recommendations:
6 Glasses of Water



Wine in moderation

Monthly

MEAT



SWEETS



EGGS



POULTRY



FISH



Weekly

CHEESE & YOGURT



OLIVE OIL



FRUITS



BEANS, LEGUMES & NUTS



VEGETABLES



Daily

BREAD, PASTA, RICE, COUSCOUS, POLENTA, OTHER WHOLE GRAINS & POTATOES



Daily Physical Activity



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CHANGES IN OLIVE OIL CONSUMPTION FROM 1990 TO 2005

<i>Country</i>	<i>Whole Country</i>	<i>Per Capita</i>
Argentina	+ 50%	+131%
Australia	+ 107%	+ 338%
Brasil	+ 85%	+ 145%
Canada	+ 145%	+ 513%
United States	+ 121%	+ 428%
Japan	+ 625%	+ 2,260%
Mexico	+ 62%	+ 229%
Russia	- 20%	- 54%
European Union	+ 53%	+ 23%

Olive Oil Sales in US Markets

1994 to 1995	+ 12%
1995 to 1996	+ 27%
1996 to 1997	+ 31%
1997 to 1998	+ 18%
1999 to 2000	+ 10%
2000 to 2001	+ 1%
2001 to 2002	+ 8%
2002 to 2003	+ 10%
2003 to 2004	+ 12%
2004 to 2005	+ 15%
2005 to 2006	+ 14%

USA Olive Oil Production, Consumption, & Imports 04-05

Production – 1.5 million L (*0.06% world*)

Consumption – 210.5 million L (*0.7% USA*)

Exports = 17 million L (*7.7% USA*)

Imports – 221.0 million L (*99.3% USA*)

From Italy – 71%

From Spain – 15%

From Turkey – 5%

From Greece – 2%

From Australia, Chile, Argentina – 7%

Australia

THE NEW NAME THAT'S ON THE TIP,
SIDES AND BACK OF EVERYONE'S TONGUE.



warded for superior taste by leading chefs from France, Italy, Belgium, Britain and Germany. Australia's ollo extra virgin olive oil now faces its most challenging audience: American foodies. So judge for yourself. Try ollo in your favorite salads or try it grilled veggies, meats and more. Get a taste of upscale dining down under. ollo. We're all about taste.

Enter our "Just Say ollo" sweepstakes at ollo.us and you could win a trip for two to Australia, mate.



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/s tasting
hemselves

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Olive Oil in California



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2004 - 07 California oil olive GROWERS & ACREAGE

• North Coast	268 growers	1,535 acres
• Central Coast	59 growers	376 acres
• S. Coast & S. Cal.	17 growers	70 acres
• Sacramento Valley	94 growers	3,216 acres*
• San Joaquin Valley	39 growers	707 acres*
• Sierra Foothills	<u>51 growers</u>	<u>264 acres</u>
TOTAL	528 growers	6,168 acres

(2005 to 2007) planted ~ 6,500 acres

(660 growers ~ 12,600 acres)

A topographic map of California, oriented vertically. The Central Valley is highlighted in green, showing its flat terrain. The surrounding mountain ranges are shown in brown and tan, indicating higher elevations. The coastal regions are shown in a lighter tan color, indicating lower elevations. The map is set against a dark blue background representing the ocean.

USA Production:
< 1% Texas & Arizona
> 99% California

Central Valley

- Lower land cost
- Abundant cheap water
- Low cost labor & housing
- Hotter – drier
- Higher yield
- Flat or more flat

Coastal California

- High cost land
- Limited expensive water
- High cost labor & housing
- Cooler – more moist
- Lower yields
- High quality “perception”

CA Olive Oil Production Outlook

- 2007-08 ~ 500,000 gallons
- 2008-09 ~ 660,000 gallons
- 2009-10 ~ 860,000 gallons
- 2010-11 ~ 1,160,000 gallons

France produces ~ 1,000,000 gallons

TO MEET CURRENT USA DEMAND for OLIVE OIL

70 million gallons = 265 million liters

We would have to plant 300,000 acres
of oil olives
@ 5 t/acre & 42 gallons/ton

How much might demand increase?

Value of California Olive Oil

- 2007 price up from \$23 to \$30/gallon
- 2007 price for “similar” imported oil \$15



Organic Olive Production Manual

This manual provides detailed information for growers on production issues, economics, pest control, the conversion process, and organic certification and registration.

Using this manual you'll learn about orchard site selection considerations, irrigation needs, terrain, temperature, soil, damage from the olive fruit fly, and how these may vary for table fruit versus fruit for oil production. You'll also learn how to evaluate harvest methods—an important consideration as harvest costs typically amount to half the total production cost for olives.

This manual has been developed as a supplement to the *Olive Production Manual, 2nd Edition*, (3353). Organic growers are advised to consult both publications as they develop and refine their production systems.

Also from the University of California, two companion publications for olive growers:

Olive Production Manual IPM for Olive



ISBN 978-1-60107-440-9



Printed in Canada



66% Growers are Ecological

ORGANIC OLIVE PRODUCTION MANUAL

UNIVERSITY OF CALIFORNIA

Organic Olive

PRODUCTION MANUAL

Technical Editor
Paul M. Vossen

UNIVERSITY OF CALIFORNIA  Agriculture and Natural Resources
PUBLICATION 3505

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200 CA Artisan Olive Oils 148 Entered into LA Fair (2007)



Boutique Industry

- Coastal & Foothill areas
- Small acreage
- Specialty varieties
- Vertical integration (fruit-oil-marketing)
- Attractive bottles
- Specialty marketing
- Prestige
- High prices – low volume – high costs
- Creates a good market for everyone



Acres planted in CA in
the last 15 years ~ 3,000

Boutique Production - CA

Cultural Operations ~ \$1,000

Harvest & Transport (\$350/ton) ~ \$1,000

Processing, Storage, Marketing, Overhead, Capital Recovery

Yield of 2.5 tons per acre @ 45 gallons per ton

Cost \$ 80 per gallon and 500-ml bottle is \$11.15



Retail \$ 300 per gallon

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High density spacing 16-20' x 8-10' 200 – 350 trees/acre





Hand Harvest

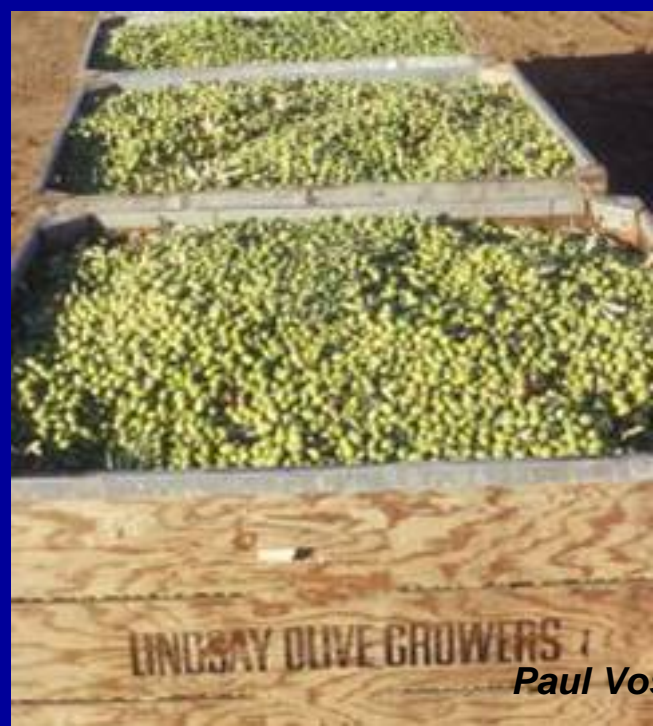
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Assisted Combs Shakers Poles



COMPARISON OF HAND HARVEST METHODS IN ONE ORCHARD ON THE LECCINO VARIETY ON THE SAME DAY WITH THE SAME LABORERS – YIELD 3.5 TONS/ACRE

<i>Tree canopy's were 11-12 ft. (3.4-3.7 m) high and 7-8 ft (2-2.5 m) in diameter</i>	<i>Hand Pick Buckets</i>	<i>Hand Pick Onto Nets</i>	<i>Pneumatic Combs</i>	<i>Mini Shaker + Poles</i>	<i>Poles Alone</i>
No. limbs broken/tree	4.16	3.75	18.7	22.3	28.0
No. fruit damaged/lb.	0.1	4.0	4.2	3.5	5.3
Minutes/tree/man	20:15	16:30	11:20	7:45	7:10
Pounds of fruit/man/hr.	39.8	47.8	71.6	103.5	111.4
Efficiency compared to hand pick into buckets	1.0 a	1.2 a	1.8 b	2.6 c	2.8 c



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Bigger Producers in CA



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Bulk Industry

- Central Valley and & Foothill areas
- Large acreage (100 acres +)
- Three varieties
- Low cost production
- Mechanized
- High Yields
- Volume sales
- Competitive prices with the Mediterranean
- Creates a good market for everyone



Acres planted in CA in
the last 3 years ~ 7,500

Big SHD Production - CA

Cultural Operations ~ \$900

Harvest & Transport (\$80/ton) ~ \$400

Overhead, Capital Recovery Equipment & Land
Yield of 5.0 tons per acre @ 42 gallons per ton

Cost ~ \$13 per gallon or \$3.44 per liter



Bulk \$ 30 per gallon



**Super-High density spacing 12-13' x 4-5'
670 – 907 trees/acre**



California New Plantings



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September to September



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Arbequina



Arbosana



Koroneiki



3rd Year Orchard

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\$ 210 per acre
\$ 42 per ton
@ 5 tons/acre



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Comparison of SHD and HD (Italy - Spain)

Super-High Density (1,660 trees /ha)

- Few varieties
- High early production
- Light competition
- OK later production
- Big investment
- Unknown life span
- Good for large farms

Intensive planting (277 trees/ha)

- All varieties work
- OK early production
- No special mgmt.
- Good later production
- Med investment
- Long life span
- OK for small farms

APPROXIMATE Yields

Standard varieties high-density system

1st to 3rd years – insignificant

4th year ~ 0.2 t/acre

5th year ~ 0.5 t/acre

6th year ~ 1.0 t/acre

7th year ~ 2.0 t/acre

8th year ~ 3.0 t/acre

9th year ~ 4.0 t/acre

10th year + ~ 6.0 to 7.0 t/acre

Precocious varieties super-high-density system

1st – insignificant

2nd year ~ 0.5 t/acre

3rd year ~ 2.0 t/acre

4th year ~ 4.0 t/acre

5th year + ~ 5.0 to 6.0t/acre



Australia Comparison Colossus vs. Shaker (07)

Overhead

- Work = 24 hrs/day
- Trees/hr = 79
- Ave. kg/tree = 18.0
- Cost/hr = \$337.62
- Cost/kg fruit \$0.28



Adolfo Levin

Shaker

- Work = 12 hrs/day
- Trees/hr = 74
- Ave. kg/tree = 19.8
- Cost/hr = \$200.69
- Cost/kg fruit \$0.23



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Australian Harvester Comparison

Trees per hour

- Side-by-side shaker – 90-180
- Braud grape – 400-550 (*small trees only*)
- Coffee – 150-280 (*small trees only*)
- Gregoire grape – 200-350 (*small trees only*)
- Colossus – 90-250

Continuous Flow System



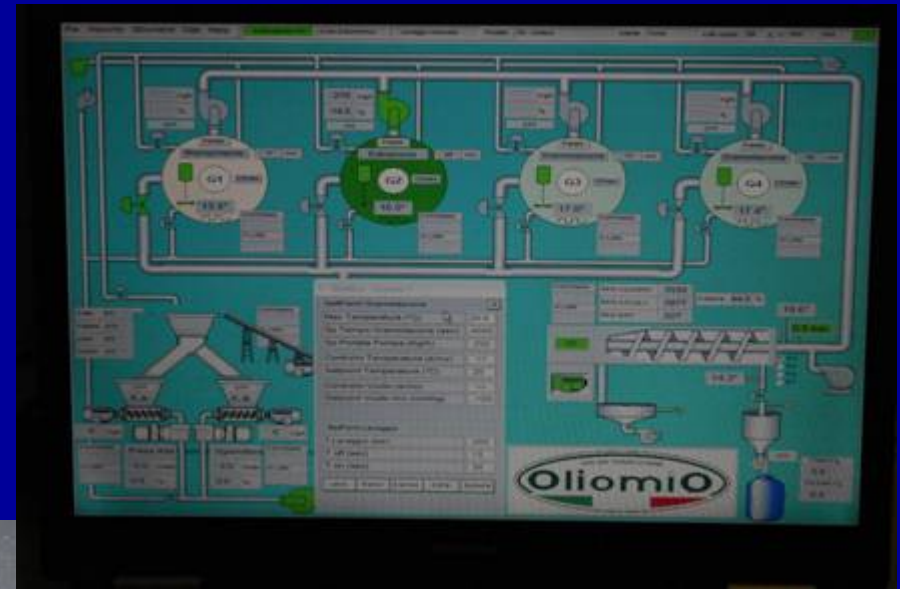
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Continuous Flow System





Automation



Olive Oil Positive Characteristics



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Cook's Illustrated Magazine Tasting



OPPOSITE RESULTS

GOOD OILS:

- Too bitter & pungent
- Too strong

BAD OILS:

- Defect not recognized
- Familiar olive oil flavor

Three Olive Oil Products

Bulk & Low cost – Refined

- \$5.99 to \$9.99/bottle
- \$23-30 per gallon



Medium Priced Imports – Low Quality

- \$5 to \$13.99/bottle
- \$30-50 per gallon



Specialty – Premium

- \$10 – 30 per bottle
- \$ 75-125 per gallon



USA MARKET

1. Olive Oil (extra light - refined)
2. Extra Virgin (bulk and retail)

**Problem: No US law
enforces**

“Extra Virgin” Standard

***Only practical way to
distinguish is by flavor***

Sensory and Production Courses



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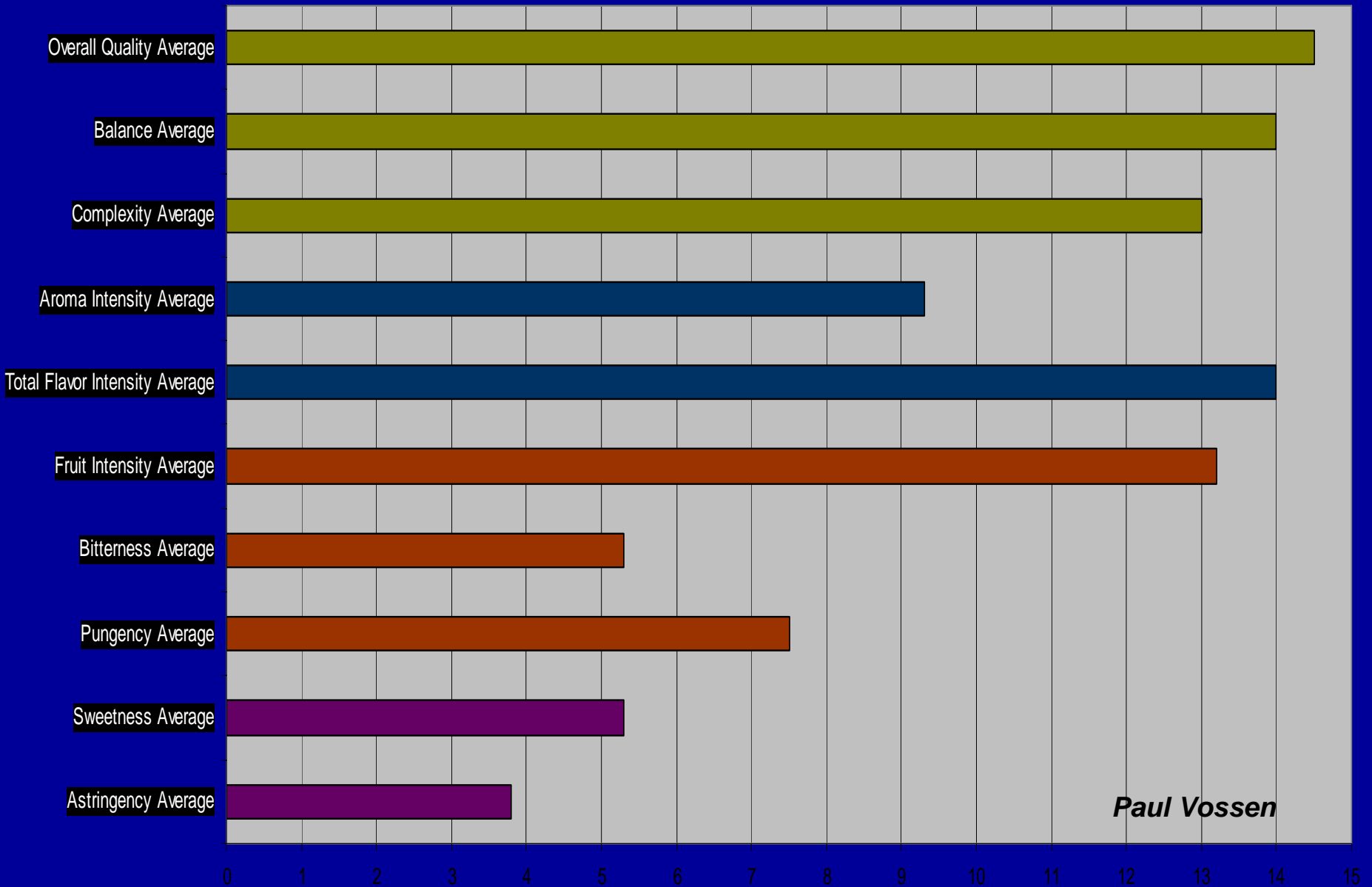
UC Research Taste Panel

- 15 point profile sheet
- Cooperation with international panels
- Intensity of aroma, bitterness, pungency, fruit intensity, sweetness, total flavor, astringency, defects, complexity, balance, finish, overall quality, and positive flavor descriptors:



Grass, herb, mint, artichoke, buttery, floral, apple, citrus, tropical, green tea, tomato, banana, berry, etc .

Varietal Trial Coastal Picual MI: 3.9 (11-15-05)



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Olive Oil Flavor Characteristics Mission Cultivar Harvestd 11-18-07 (MI 3.8) - Sonoma



Specific Flavor Characteristics

Extra Virgin Olive Oil

- **Less Than 1% Free Acidity**
- **Less Than 20 ppm Peroxide Level**
- **Made Mechanically**
- **Taste Panel Rating of Zero Defects**
- **Taste Panel Rating of Some Positive Attributes**

NINE GRADES

1. Extra Virgin

2. Virgin

3. Ordinary

4. Lampante (Lamp)

VIRGIN

5. Refined

6. Olive Oil

7. Crude Pomace Oil

8. Refined Pomace Oil

9. Olive Pomace Oil

REFINED

IOOC STANDARDS

for authenticity & typicalness

- **Sterol Content**
- **Tocopherols – Polyphenols - Pigments**
- **Fatty Acid Profile**
- **Saturated Fatty Acids in 2-position**
- **Unsaponifiable Material**
- **Wax Content**
- **Stigmastadienes**
- **Erythrodiol + Uvaol**
- **Hydrocarbon Content**
- **Presence of *trans* fatty acids**

IOC OLIVE OIL STANDARDS

- **Sensory Characteristics**
- **Color – Aspect**
- **Free Acidity – Peroxide Value**
- **UV Absorbency (bitterness & stability)**
- **Water and Insoluble Impurities**
- **Flash Point**
- **Metal Traces – Halogenated Solvents**

Legal Standards Enforcement

Laboratory



Sensory

Solutions

- **USDA Standards**
- **Independent Taste Panel**
- **Marketing Order (Commission)**

California Olive Oil Council is a “Trade Association”

De Gustibus Non Est Disputandum



Robert Mondavi Institute Olive Center



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Olive Oil Profitability Potential in California

Positives

- Basic Resources
- Big USA Market
- Competitive cost with mechanical harvest
- Low water use crop
- Excellent CA Quality
- High CA Demand
- Low Import Quality
- Early Productivity
- Good Prices
- EU Subsidy decline

Negatives

- Cheap imports
- Must market Quality to US Consumers
- Unknowns of SHD System tree mgmt.
- Unknowns of HD System Efficiency

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