The US Experience on Olive Oil Production and Quality

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WHO WE ARE

- Self supporting
- Research, education and outreach
- A portal to UC Davis and global resources
- Dedicated to California
RESEARCH SUPPORT

- Olive Oil Commission of CA
- California Olive Committee
- USDA and CDFA
- Olive Center resources
- Philanthropic
US OLIVE OIL CONSUMPTION

 IOC, June 2018
CALIFORNIA OLIVE OIL PRODUCTION

Gallons

2004/5  |  2016/17  |  2018/19
0       | 4000000   | 1750000

OLIVE OIL COMMISSION OF CALIFORNIA

• State governmental entity, CDFA
• Recommend CA standards and fund research
• Grower assessment ≤ 25 cents/gal, > 5,000 gal
• Mandatory testing and traceability
## STRICTER CALIFORNIA STANDARDS

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<thead>
<tr>
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<th>IOC</th>
<th>CALIFORNIA</th>
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<tbody>
<tr>
<td>FFA</td>
<td>≤ 0.8</td>
<td>≤ 0.5</td>
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<tr>
<td>PV</td>
<td>≤ 20</td>
<td>≤ 15</td>
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<tr>
<td>$K_{232}$</td>
<td>≤ 2.50</td>
<td>≤ 2.40</td>
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<tr>
<td>DAGs</td>
<td>-</td>
<td>≥ 35</td>
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<tr>
<td>PPP</td>
<td>-</td>
<td>≤ 17</td>
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RESEARCH ON QUALITY AND PURITY

- Analyzed testing data shortly after harvest
- Analyzed CA olive oil > one year after harvest
- Analyzed data on sterols and fatty acids.
MANDATORY TESTING RESULTS

- All 161 samples designated as EXTRA VIRGIN grade prior to testing met those standards.
- 11 of 12 samples designated as VIRGIN or CRUDE grade met those standards.
- 13 of 14 samples UNDESIGNATED met extra virgin standards.

UC Davis Olive Center, “Evaluation of Mandatory Testing California Olive Oil 2017/18 Season,” Submitted to the Olive Oil Commission of California, August 2018
UC Davis Olive Center, “Evaluation 50 California Olive Oil Samples at Least One Year After Harvest,” Submitted to the Olive Oil Commission of California, August 2018
PURITY STANDARDS DON’T FIT CA CHEMISTRY

- 9% (6 of 70 samples) outside USDA limits
  - ½ Koroneiki
  - ½ Central Valley
  - ~½ Desert

UC Davis Olive Center, “Evaluation of Sterol and Fatty Acid Profiles, California Olive Oil 2017/18 Season” Submitted to the Olive Oil Commission of California, August 2018
LOW-COST PURITY METHOD ON HORIZON

- Saves prep hours
- Dilute and shoot
- Detect @ 5 - 10%

Graph showing PCA with PC1 and PC2 axes, and data points for different EVOO concentrations, including 10%, 25%, 50%, 75%, 80%, 90%, 95%, and 100% EVOO, as well as High Oleic Sunflower and EVOO. The graph also includes a 95% confidence ellipse for EVOO and TAGs.
BETTER ACCURACY OF FRUIT PARAMETERS

- NIR for oil/moisture analysis
- Database is key to accuracy
- Options for all production sizes

IMPROVING PROCESSING

- Impact of crushing speed on oil extraction and quality (Arbosana)
- Interaction between crushing variables and malaxation time (Arbequina)
CRUSHING SPEED RESULTS

- Hammer mill rotor speed at 2400, 3000, 3600 rpm. At 3600 rpm:
  - Oil extraction +1.2%
  - Pungency +29%, other sensory unchanged
  - Total phenols +18%
  - Chlorophyll increased

CRUSHING AND MALAXATION RESULTS

- Crushing speed (2400 or 3600 rpm)
- Grid size (5 mm or 7 mm)
- Malaxation time (30 or 75 minutes)

CRUSHING AND MALAXATION RESULTS

- Combination of smaller grid size, lower rotor speed, and longer malaxation time gave the highest yield (89.4%)
- Same variables with shorter malaxation time gave the lowest yield (84.7%)
- FFA, PV, and DAGs adversely affected by longer malaxation time

FUTURE RESEARCH INTERESTS

- Higher yield in olive production
  - Olive Knot
  - Climate resilience
  - Breeding
  - In states outside of CA

- Improve and understand nutrition of EVOO

- Byproduct
THANK YOU
FOR YOUR ATTENTION