

## **BEST PRACTICES FOR HARVEST TIMING, HARVEST & FRUIT HANDLING**



BOUNDARY BEND  
LIMITED

ADAM ENGLEHARDT

© 2015 Boundary Bend Limited

## **Influence of Agronomic Aspects on Olive Oil Quality**



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

### **Agronomic Aspects**

#### **Factors which are difficult to change:**

- Variety.
- Environmental conditions.

#### **Factors which are easier to manipulate:**

- Pests & diseases.
- Irrigation.
- Harvest & transport.
- Pruning.
- Fertilisation.



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

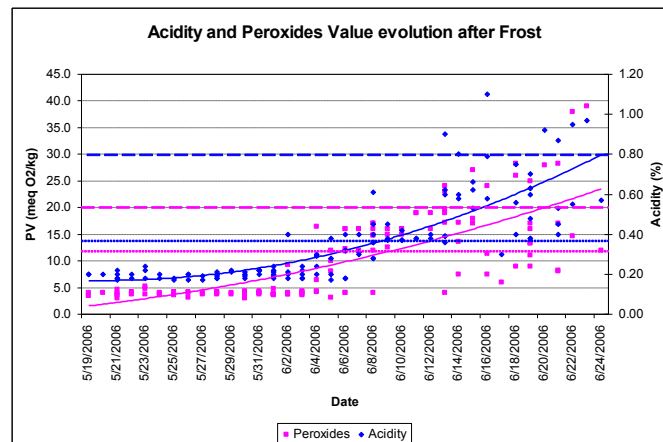
## **Frost**



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Frost Damage



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

- Sudden cold change will turn the olives into a brownish colour.
- Gradual cold change could lead to olive dehydration (Reversible or not).
- Both will affect the organoleptic characteristics of the oil, its acidity and peroxides value.



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

- Frost fans.
- Harvest immediately.
- Low areas first.
- Crush with large grids and low temperatures in the malaxer.
- Deodorization.



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

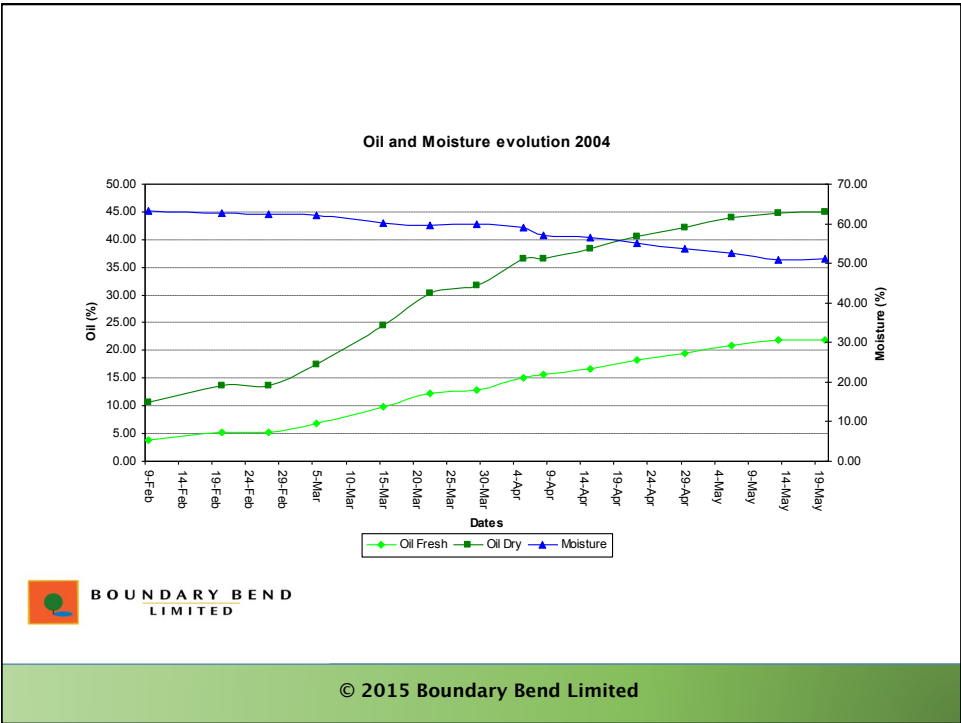
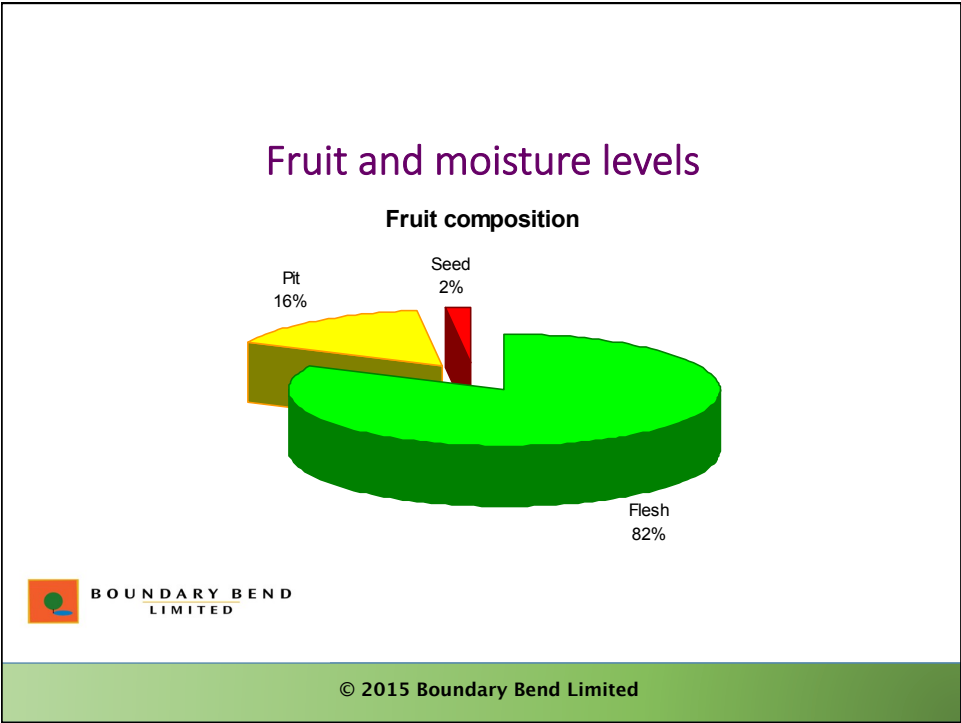
## Mummified Fruit



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited





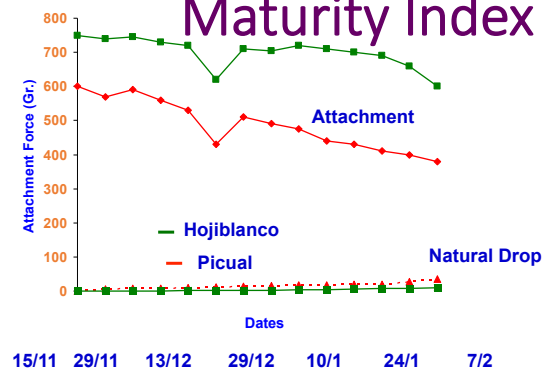
## Maturity Index



BOUNDARY BEND  
LIMITED

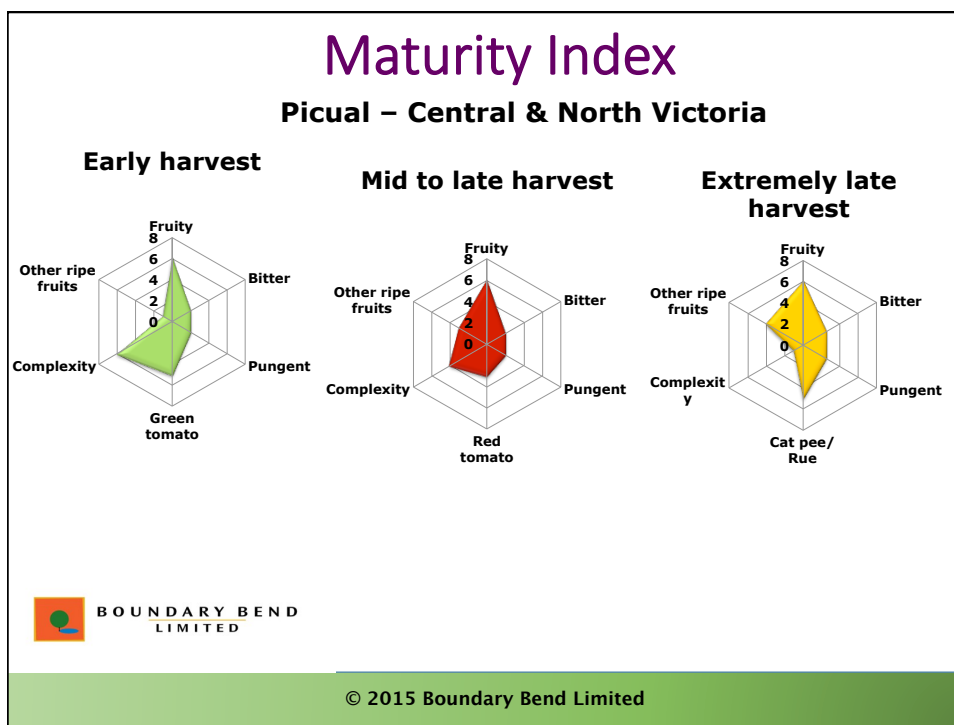
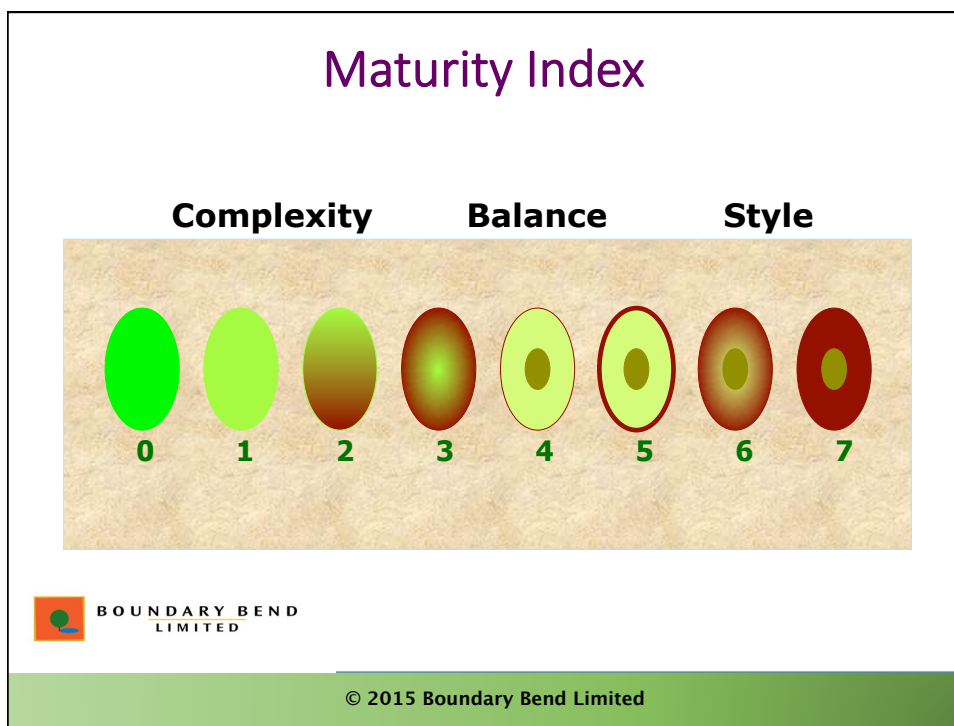
© 2015 Boundary Bend Limited

## Maturity Index



BOUNDARY BEND  
LIMITED

Marino Uceda – Australia 2005 © 2015 Boundary Bend Limited



## HARVESTERS



Colossus



Single side shakers



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Harvester Performance Fruit damage

Average oil acidity vs. harvester (Olive West)

Harvester	Acidity (%)
Ag-Right Heads	0.31
AOH Shaker + beaters	0.28
Colossus	0.22
Grape Harvester	0.20
Gregoire 133	0.31
Hand harvest	0.13
Sicma shaker + pneumatic rakes	0.56
Sicma shaker	0.13



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Materials Other than Olives (MOO)



© 2015 Boundary Bend Limited

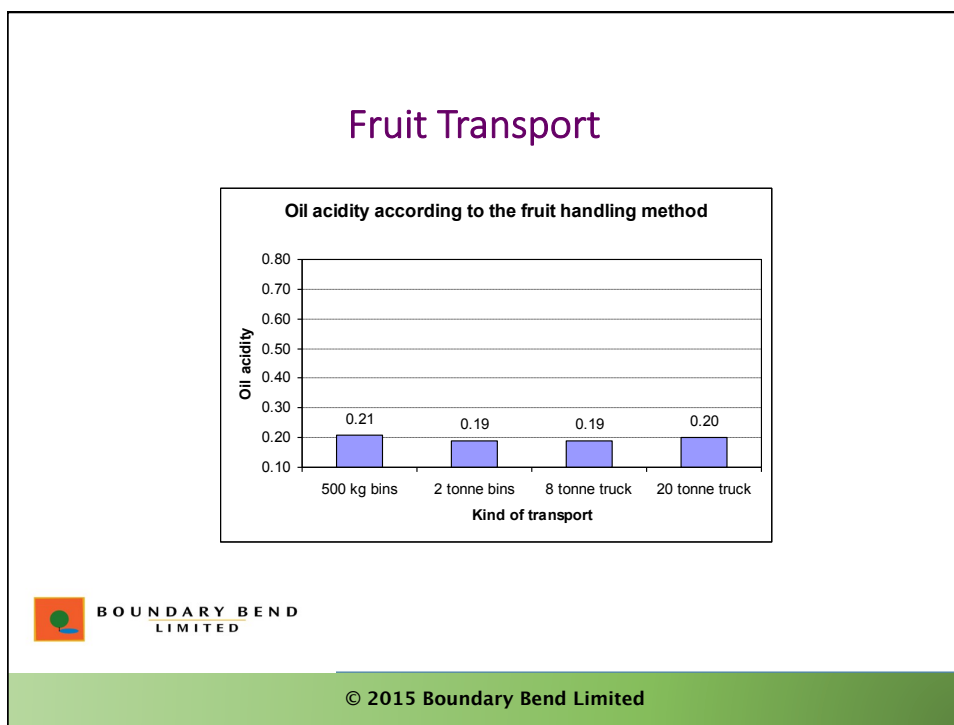
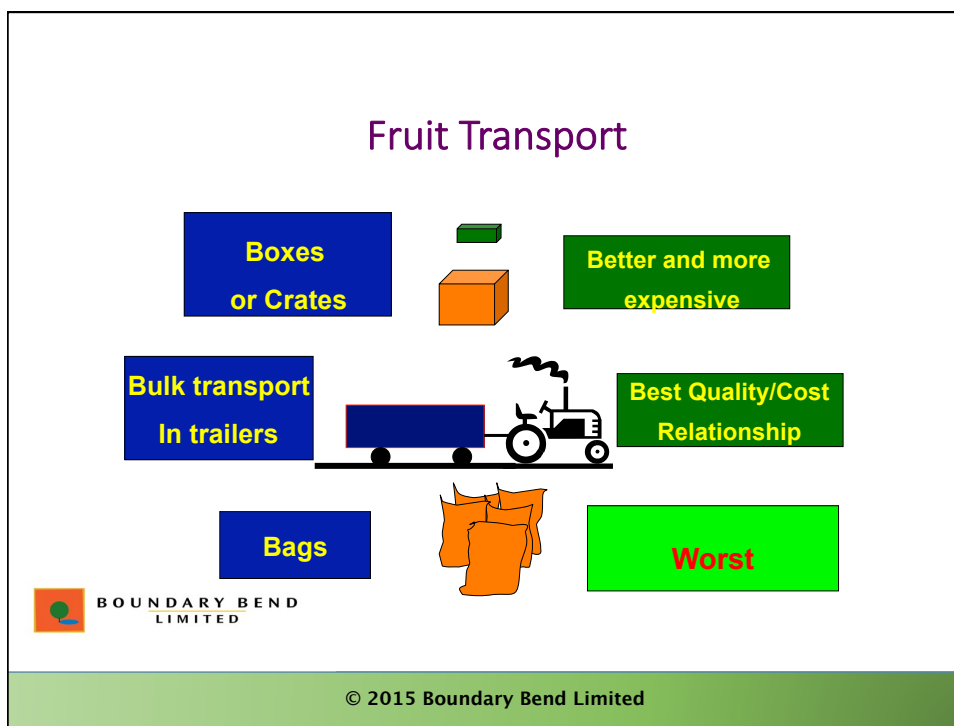
## Materials Other than Olives (MOO)

Optimal:	< 5.0% (0-1)
Good:	5.0-15.0% (2-3)
Dangerous:	15.0-25.0% (4-5)
Not acceptable:	> 25.0%

- Feedback to grove manager about harvesters.
- Avoid astringent leaf flavours in the oil (More than 1% MOO).
- Avoid problems with washing equipment.



© 2015 Boundary Bend Limited



## Fruit Temperature



BOUNDARY BEND  
LIMITED

Depth (cm/inches)	Temperature (°C/°F)
0	22/72
10/4	38/100
30/12	45/113
50/20	42/108
80/32	45/113
120/48	32/90
150/60	32/90

## Fruit Temperature

Optimal  
Good  
Increasing risk  
Quality affected  
Not acceptable

< 5°C (9°F) above air T°  
5-10° (9-18°F) above air T°  
10-15° (18-27°F) above air T°  
15-20° (27-36°F) above air T°  
>20° (36°F) above air T°



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

### Harvesting-Processing delay



© 2015 Boundary Bend Limited

### Best Practices for Milling and Storage with respect to oil quality



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited



## Harvesting-Processing delay

- One of the most important parameters affecting oil quality.
- Fruit should be processed within 12 hours to avoid quality issues.
- A delay longer than 24 hours will most likely have an impact on the oil quality.
- Aerobic and anaerobic fermentations inside the fruit pile end up increasing FFA, FAEEs, DAGs, etc.
- Organoleptic problems = Fusty and Musty!!



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Fruit receipt



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Fruit receival



10:25am



11:05am



11:20am



11:25am



11:30am



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Visual inspection

**Soft Nose**



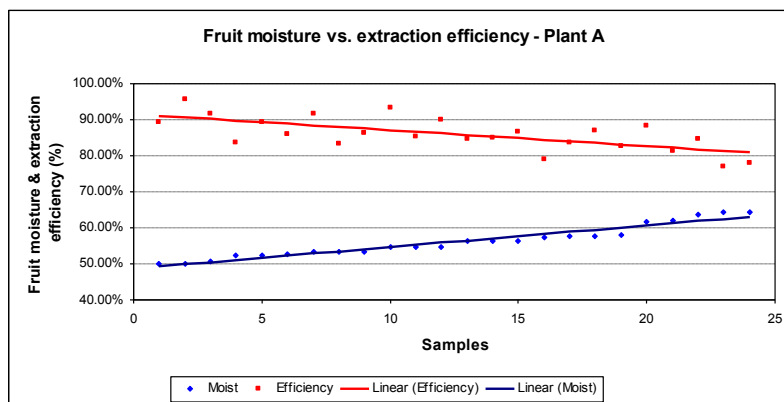
**Frost**



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

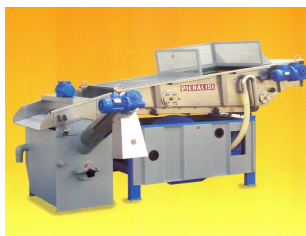
## Fruit and moisture levels



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Washing



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Washing or not?

### No Changes

*Oil/Dry Matter*  
*Peroxides Value*  
*K<sub>270</sub>*  
*K<sub>232</sub>*

### Changes

*Fruit Moisture* ↑  
*Oil losses in pomace* ↑  
*Extractability* ↓  
*Total Polyphenols* ↓  
*Shelf Life* ↓  
*Fruitiness* ↓



BOUNDARY BEND  
LIMITED

Marino Uceda – Australia 2005 © 2015 Boundary Bend Limited

## When should I change the water?



< 0.10% Oil  
< 0.50% Solids

Usually every 5-10 x capacity of washer

e.g. 7 tonne/hr washer

Replace water every 35 – 70 tonnes



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Fruit storage

- High risk of ↑↑ FFA & “fusty” defect if not frequently inspected
- High risk of ↑↑ FFA if ripe, mashy fruit
- ↑↑ Chlorophylls content and greener oil if olives start fermenting
- Risk of increasing E+U, FAEs and DAGs



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

Before the season:

- Suggest improvements in the receival area.
- General cleaning and maintenance of the receival equipment.

During the season:

- General cleaning and maintenance of the equipment.
- Inspection of the fruit and directing lines or washing needs.
- Fruit sampling.
- Changing washing water.
- Evaluating oil losses in washing water.
- Evaluating MOO after washing.
- Rotating fruit in clean fruit hoppers.



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

# Crushing Paste Preparation Malaxing Temperature & Time



© 2015 Boundary Bend Limited

## Crushing

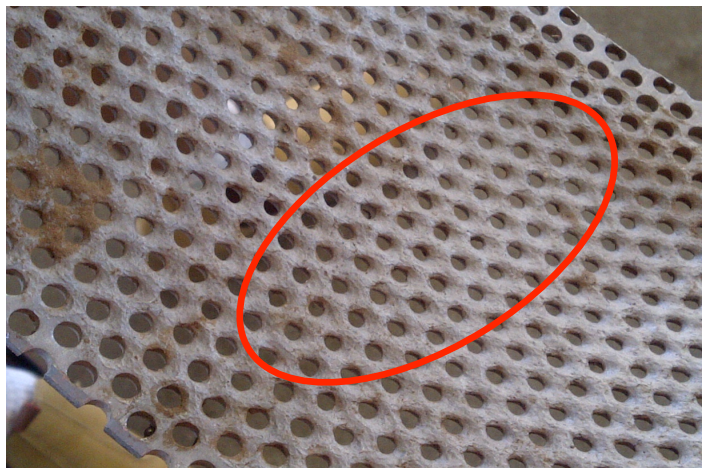


© 2015 Boundary Bend Limited



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited



## Crushing

### Processing degree of difficulty

1. High fruit moisture. Emulsions formation.
2. Lipophyllic affinity of the pulp.
3. Poor paste preparation.



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Crushing

- Lower bitterness with double grid hammer mills
- ↑↑ rotating speed gives higher polyphenols and oxidation stability to oil
- Risk of ↑↑ **PV** if hammers wear out leaving metal traces in oil
- Smaller grid sizes: Higher chlorophylls content (greener oils) & higher polyphenols



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited



## Malaxing



PLANTA DE OBTENCIÓN DE ACEITE DE OLIVA SRI-7 COOP. SAN ISIDRO DE LOJA (CO)



BOUNDARY BEND  
LIMITED



© 2015 Boundary Bend Limited

## Malaxing

Visual checks:

- There is a large amount of oil floating on top of the paste in the last vat of the malaxer.
- The blades of the malaxer come out clean from the paste
- The paste shows an evident cracking with a bright dark colour
- The paste behaves as a solid, not as a liquid



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Malaxing

- Time.
- Temperature.



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Malaxing

What temperature?

- As low as possible but not lower than 22°C (72°F) . (Problems with efficiency and solubilization of PPH and chlorophylls)
- EC regulation "Cold extraction" < 27°C (80.6°F).
- Between 25°C and 30°C (77°F & 86°F).
- Start at 28°C (82°F) and apply variations controlling the oil in pomace.

How much time?

- As short as possible but not less than 45 min.
- Between 45 min and 120 min.
- Start at 75 min and apply variations controlling the oil in pomace.
- According to research studies, sealed malaxer minimise the negative impact
- of longer malaxing times on quality.



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Temperature

- ↑↑ PV
- ↓↓ Rancimat® stability
- ↑↑ Polyphenols & ortodiphenols
- ↑↑ Bitterness & “harshness” taste feeling
- “Overcooked” defect
- ↓↓ Fruitness in nose
- ↑↑ Chlorophylls
- ↑↑ Trans fatty acids (18:1T).
- ↑↑ E+U, Stigmasterol and Total sterols



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Time

- ↓↓ Polyphenols & ortodiphenols
- ↓↓ Bitterness
- “Pomacy” taste feeling
- ↑↑ E+U and Stigmasterol
- ↑↑ Waxes & aliphatic alcohols



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

- **Talc & microtalc powder:** essential with difficult pastes or high moisture fruit. No impact on oil quality
- **Common salt:** Low cost option. No impact on oil quality, though there is a significant increase in conductivity of pomace
- **Calcium carbonate:** another cheap option. High paste extractability. Increases pH of pomace and could impact quality if not properly used
- **Enzymes:** Effective under most conditions. Doses depend on the year and fruit ripeness. No impact on oil quality
- **Warm dipping:** Difficult to implement. Only effective with temperatures above 60°C. It does change the oil quality
- **Ultrasound:** Promising technology. No impact on quality
- **Microtalc powder & enzymes** could be an interesting combination depending on the fruit condition



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Oil storage



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Oil storage

- Temperature: 15 (59°F) – 18°C (64°F)
- No light.
- Settlings drained regularly.
- Nitrogen: Max. = [4.0%] of O<sub>2</sub>
- Minimise head space



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

## Oil storage

- Insulated.
- Electric illumination only.
- Well designed drainage system.
- Temperature control system.
- Secure.



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited

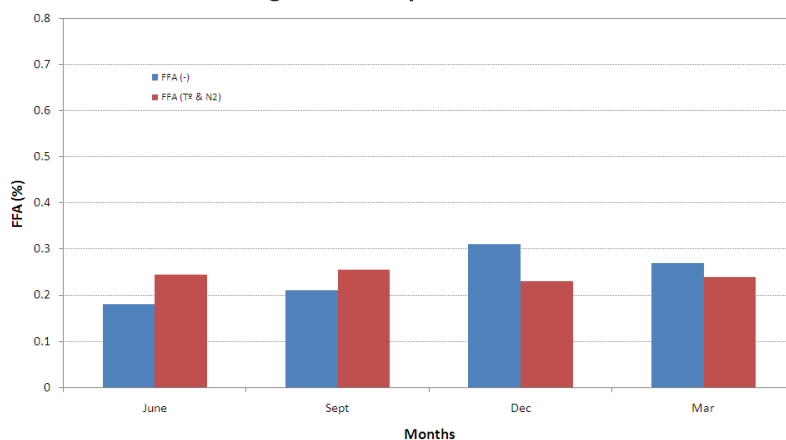
## Oil storage



BOUNDARY BEND  
LIMITED

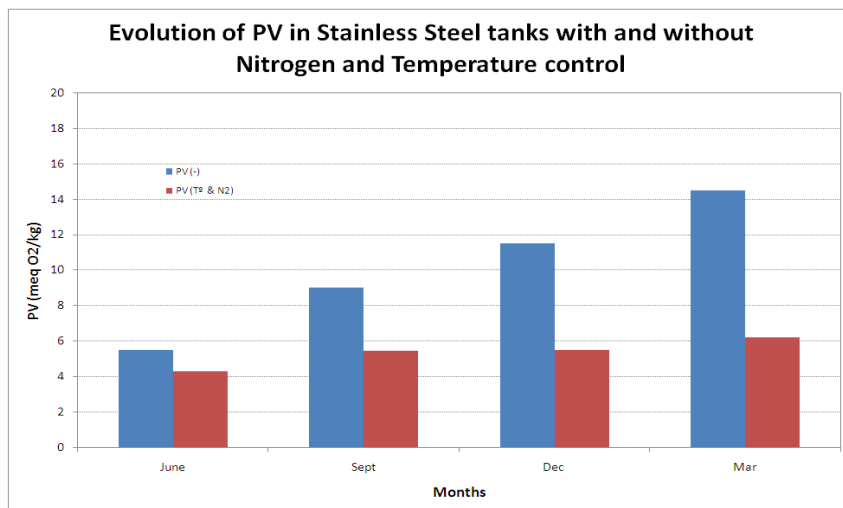
© 2015 Boundary Bend Limited

Evolution of FFA in Stainless Steel tanks with and without  
Nitrogen and Temperature control



BOUNDARY BEND  
LIMITED

© 2015 Boundary Bend Limited



**BOUNDARY BEND  
LIMITED**

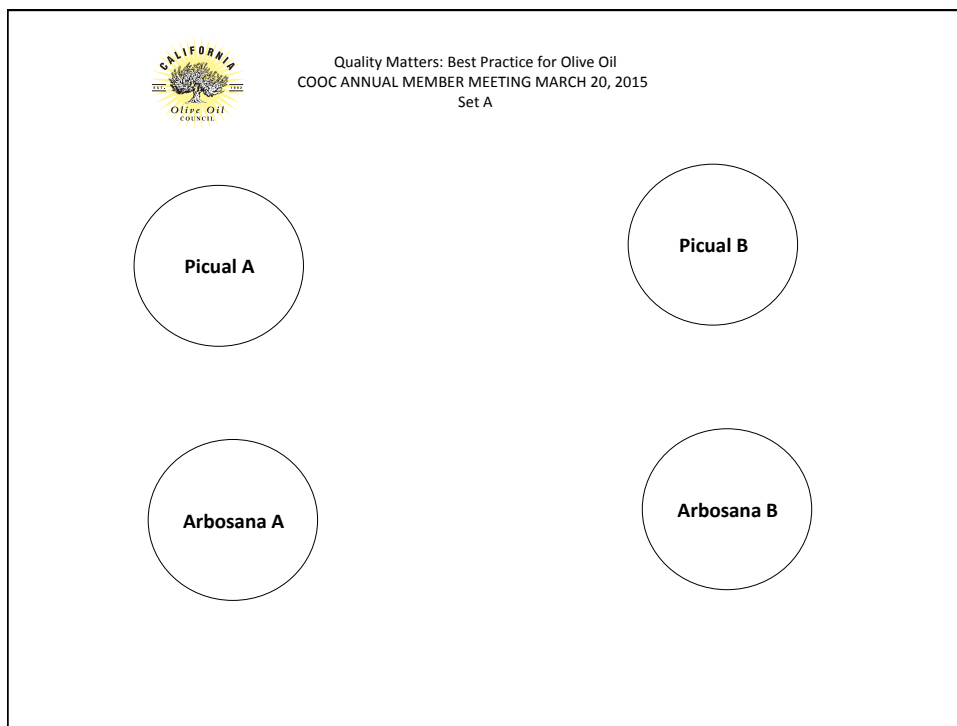
© 2015 Boundary Bend Limited

SAMPLE CODE _____				
SAMPLE NAME _____				
Positive Attributes				
<b>Fruity</b>	Slight	Medium	Intense	
<b>Bitter</b>	Slight	Medium	Intense	
<b>Pungent</b>	Slight	Medium	Intense	
Robustness	Mild	Medium	Strong	
Descriptors _____				
Other comments _____				

SAMPLE CODE _____				
SAMPLE NAME _____				
Positive Attributes				
<b>Fruity</b>	Slight	Medium	Intense	
<b>Bitter</b>	Slight	Medium	Intense	
<b>Pungent</b>	Slight	Medium	Intense	
Robustness	Mild	Medium	Strong	
Descriptors _____				
Other comments _____				


SAMPLE CODE _____				
SAMPLE NAME _____				
Positive Attributes				
<b>Fruity</b>	Slight	Medium	Intense	
<b>Bitter</b>	Slight	Medium	Intense	
<b>Pungent</b>	Slight	Medium	Intense	
Robustness	Mild	Medium	Strong	
Descriptors _____				
Other comments _____				

SAMPLE CODE _____				
SAMPLE NAME _____				
Positive Attributes				
<b>Fruity</b>	Slight	Medium	Intense	
<b>Bitter</b>	Slight	Medium	Intense	
<b>Pungent</b>	Slight	Medium	Intense	
Robustness	Mild	Medium	Strong	
Descriptors _____				
Other comments _____				





<p>SAMPLE NAME _____</p> <p><b>Positive Attributes (circle intensity)</b></p> <p>• <b>Fruity Aroma</b> Slight Medium Intense</p> <p>• <b>Bitter</b> Slight Medium Intense</p> <p>• <b>Pungent</b> Slight Medium Intense</p> <p><b>Robust Scale:</b> Mild Medium Strong</p> <p><b>Complexity</b> Low Medium High</p> <p>Were attributes in <b>Balance</b>? YES NO</p> <p><b>Aroma/Flavor Descriptors</b></p> <p>_____</p> <p><b>Other Comments/Notes:</b></p> <p>_____</p>	<p>SAMPLE NAME _____</p> <p><b>Positive Attributes (circle intensity)</b></p> <p>• <b>Fruity Aroma</b> Slight Medium Intense</p> <p>• <b>Bitter</b> Slight Medium Intense</p> <p>• <b>Pungent</b> Slight Medium Intense</p> <p><b>Robust Scale:</b> Mild Medium Strong</p> <p><b>Complexity</b> Low Medium High</p> <p>Were attributes in <b>Balance</b>? YES NO</p> <p><b>Aroma/Flavor Descriptors</b></p> <p>_____</p> <p><b>Other Comments/Notes:</b></p> <p>_____</p>	<p>SAMPLE NAME _____</p> <p><b>Positive Attributes (circle intensity)</b></p> <p>• <b>Fruity Aroma</b> Slight Medium Intense</p> <p>• <b>Bitter</b> Slight Medium Intense</p> <p>• <b>Pungent</b> Slight Medium Intense</p> <p><b>Robust Scale:</b> Mild Medium Strong</p> <p><b>Complexity</b> Low Medium High</p> <p>Were attributes in <b>Balance</b>? YES NO</p> <p><b>Aroma/Flavor Descriptors</b></p> <p>_____</p> <p><b>Other Comments/Notes:</b></p> <p>_____</p>
<p>SAMPLE NAME _____</p> <p><b>Positive Attributes (circle intensity)</b></p> <p>• <b>Fruity Aroma</b> Slight Medium Intense</p> <p>• <b>Bitter</b> Slight Medium Intense</p> <p>• <b>Pungent</b> Slight Medium Intense</p> <p><b>Robust Scale:</b> Mild Medium Strong</p> <p><b>Complexity</b> Low Medium High</p> <p>Were attributes in <b>Balance</b>? YES NO</p> <p><b>Aroma/Flavor Descriptors</b></p> <p>_____</p> <p><b>Other Comments/Notes:</b></p> <p>_____</p>	<p>SAMPLE NAME _____</p> <p><b>Positive Attributes (circle intensity)</b></p> <p>• <b>Fruity Aroma</b> Slight Medium Intense</p> <p>• <b>Bitter</b> Slight Medium Intense</p> <p>• <b>Pungent</b> Slight Medium Intense</p> <p><b>Robust Scale:</b> Mild Medium Strong</p> <p><b>Complexity</b> Low Medium High</p> <p>Were attributes in <b>Balance</b>? YES NO</p> <p><b>Aroma/Flavor Descriptors</b></p> <p>_____</p> <p><b>Other Comments/Notes:</b></p> <p>_____</p>	



Quality Matters: Best Practice for Olive Oil  
COOC ANNUAL MEMBER MEETING MARCH 20, 2015  
Set B

**2013**

**Bobby Lucero**

*Manzanillo*

**2013**

**Rancho El Molino**

**2013**

**Ojai Olive Oil**

*Signature*

**2014**

**Bobby Lucero**

*Manzanillo*

**2014**

**Rancho El Molino**

