Mechanical Shoot & Leaf Removal Practices

Sean Dean
Introduction

• Why look for mechanical solutions?

• Mechanical shoot thinning – Murray Valley

• Mechanical Leaf removal – King Valley

• Limitations
Why mechanisation?

• 4 key reasons BB started looking at mechanical solutions:
  1. Reduce Vineyard Labour Cost
     o Labour is between 42% to 65% of our operating budgets
     o Finding ways to reduce this cost without impacting quality
  2. Enable labour intensive practises on commercial grade fruit
     o Shoot thinning & Leaf Plucking $500-$700/Ha
     o Limit there use to high value fruit
  3. Improve the speed & consistency of traditionally time consuming tasks
     o Mechanical methods are FAST and give a consistent level of quality
  4. OH & S benefits
     o Vineyards are hostile places and reducing the company’s exposure to this risk is a significant reason to move towards mechanisation
Mechanical Shoot Thinning Murray Valley Style!!

Source: walporahillswines.co.nz
Mechanical Shoot Thinning

- Shoot thin at Mystic Park??
  - Large Murray Valley vineyard
  - Gordo, Crouchen & Cienna
  - Fruit destined for commercial grade fruity wines
  - Predominately machine pruned
  - High cropping 18 – 40t/Ha
  - WHY??
Mechanical Shoot Thinning

- Crop reduction in Cienna
  - 81Ha at Mystic Park
  - CSIRO Variety
  - Target Baume 14+
  - High colour fruity red
  - Tends to over crop
    - Methoxypyrazine compounds
    - Very Late Ripening
    - High risk of disease

AVERAGE YIELD ~27t/Ha
TARGET YIELD 20T/HA
Mechanical Shoot Thinning

• Past we have Mechanical bunch thinned
  - Harvester used at EL31
  - Aim to knock 25% of fruit off
  - HARD TO ACCURATELY DETERMINE THINNING RATE
  - VINE & FRUIT DAMAGE
Mechanical Shoot Thinning

• Started looking at Mechanical Shoot thinning

• Mechanical shoot thinning trial to answer:
  o Easier to estimate crop reduction?
  o Just as effective as mechanical bunch thinning?
  o Able to conduct early in the season?
  o Less impact on both vine and fruit?
  o Quicker process?
Shoot Thinning 2015
Shoot Thinning 2015

Treatment 1

Treatment 2

Treatment 3

Treatment 4
Shoot Thinning 2015

• Things we learnt from 2015

  o Treatment 4 was the best
    o Reduced yield by 12%
    o Didn’t completely strip the vine
    o Removed whole shoots

  o Taped fingers were too rigid & caused damage
Shoot Thinning 2016

- 2015 led to the following thinner setup in 2016:
  - Simple frame supporting two hydraulic motors
  - Insertion rubber fingers
  - Spinning on the horizontal axis in a downward direction
  - Thinning rate greater on the top cordon
## Shoot Thinning 2016

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Crush Date</th>
<th>Area (Ha)</th>
<th>Yield (T)</th>
<th>T/Ha</th>
<th>Harvest Maturity (Be)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>14th MAR</td>
<td>1.39</td>
<td>34.35</td>
<td>24.79</td>
<td>14.0</td>
</tr>
<tr>
<td>Thinned</td>
<td>10th &amp; 15th MAR</td>
<td>5.02</td>
<td>97.56</td>
<td>19.43</td>
<td>14.3</td>
</tr>
</tbody>
</table>

- Great result!!
- Yield reduced by 22%
- No change in Harvest date but thinned section slightly higher Baume
Shoot Thinning 2016

- Fruit & Vine Damage at Harvest – Shoot Vs Bunch Thin

Mechanical **Shoot** Thinning

Mechanical **Bunch** Thinning
Questions Answered

- Easier to estimate crop reduction? **YES**
- Just as effective as mechanical bunch thinning? **YES**
- Able to conduct early in the season? **YES**
- Less impact on both vine and fruit? **YES**
- Quicker process? **Slower 1Hr/Ha Vs 0.7Hrs/Ha**
Financials

• Labour Saving
  o Hand Shoot thinning labour ~$650/Ha
  o Machine Shoot thinning labour ~$25/Ha

• Productivity Gain
  o 1hrs/ha Vs 25hrs/ha
Mechanical Leaf removal
Mechanical Leaf Removal

• 3 Key reasons we mechanically leaf pluck:
  o Reduce Botrytis pressure in Dolcetto & Riesling at Milawa
  o Aid in fungicide penetration at Banksdale
  o Achieve a 15 to 20% productivity gain when handpicking at Whitlands
Mechanical Leaf Removal

- The unit we use is an ERO Single side roller Defoliator.

- The two vertical rotating rollers pluck the leaves

- Fan at the back extracts leaves away from the fruit zone

- Has hydraulic width & mast adjust
Mechanical Leaf Removal

- When to leaf pluck?
  - Disease & Spray penetration control - EL 26 onwards
Mechanical Leaf Removal

- When to leaf pluck?
  - Hand picking productivity – 1 day before harvest
Financials

• Cost of Unit
  o ~$24,000

• Labour Saving
  o Hand leaf plucking labour - ~$500/Ha
  o Machine leaf plucking labour - ~38/Ha
  o Hand Harvesting - ~20% productivity gain
Limitations

• If you need a 100% perfect job then do it by hand!!

• Shoot Thinner Limitations
  o Will still shred some shoots
  o May still ½ break some shoots
  o Harder to estimate reduction in crop compared to hand pass
  o Not selective
  o Best suited to large canopies with high shoot number

• Leaf Defoliator
  o Needs to be a VSP canopy to work well
  o Small level of damage to post veraison fruit
THANK YOU

Questions?

0418 387 109

sndean@brownbrothers.com.au