How big is my crop?

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Introduction

The impacts of crop estimation are multi-faceted. Correct estimation of yield from season to season is a critical part of the vineyard to winery relationship. According to recent research, forecasts given by growers to wineries show an average 33% error (Ashcroft et al, 2002). Such error tends to strain the grower winery relationship. Long before the first grapes are harvested, the winery that purchases the grapes needs to know an accurate estimation of yield. The winery needs time to determine its requirement for the oncoming vintage, and to ensure that it has the tank space required and thus the staff and equipment necessary to manage this intake. If the grower is supplying their own wine label, crop estimation is also a useful budgeting tool. An accurate estimation of yield may help determine the wine production, and potential sales for that vintage.

However, yield estimation tends to be the bane of every grower. Seasonal fluctuations can cause growers to give up entirely as it becomes increasingly difficult to estimate yield correctly. It is time consuming and repetitive, which can turn away the hardest worker. Even so, it is one of the most important viticultural practices to be carried out during the season and time must be allocated to the procedure, however long it takes.

Yield Estimation Experience

Nassau Estate, part of Capital Vineyards Pty Ltd, is a 160-hectare vineyard situated at Canowindra, NSW in the Cowra Region. Established in 1996, Nassau Estate grows four varieties, Chardonnay, Semillon, Shiraz and Cabernet Sauvignon. All four varieties are grown on the Smart Dyson trellis system with the exception of 17 hectares of Shiraz on Scott Henry trellis.

Yield estimation was first carried out during the 1998 – 1999 vintage. The Orlando Wyndham Group (OWG) Yield Estimation Kit was used initially during the 1999 – 2000 vintage, and has subsequently been used every year.

Selecting representative vines

At the commencement of the 1999 – 2000 vintage, representative vines were selected using a random number table. To achieve this, the yield estimator needs to know the number of rows within a block or group of blocks and the number of vines in those selected rows. The thirty vines selected are then permanently marked as the same vines are counted for yield estimation twice a season and every subsequent year.

Conducting the estimate

To calculate a yield estimate, the yield estimator needs to collect three items of information: the number of vines within the block or group of blocks, the average number of bunches and the average bunch weight.

The number of vines within a block or group of blocks is calculated by vine and row spacing. Average bunch number is counted in the field twice each year, and bunch weights are calculated from an average of local harvest bunch weights and Nassau Estate harvest bunch weights.

Harvest Bunch weights

The average bunch weights are calculated back from the tonnage picked at harvest. This is calculated by dividing the harvested yield of the block(s) by the number of vines within the block(s). This result is then divided by the bunch numbers obtained from the revised estimates or latest estimate. It is therefore essential that bunch counts are accurate to ensure that the calculated bunch weight will be accurate.

Crop Estimation Outcomes

Figures 1 to 4 demonstrate the increased accuracy obtained when a yield estimation kit is consistently used over a period of time. These figures compare the results for Chardonnay, Semillon, Shiraz and Cabernet Sauvignon. The SD value above the columns indicates the Standard Deviation (SD). The initial estimate, revised estimate and harvest values for each variety were used to calculate the SD. The SD indicates how far the result deviates from the mean, the lower the value, the more accurate the result.

Figure 1 outlines the variation between the initial and revised estimates and harvested tonnages for the four varieties. These 1999 crop estimates were determined by multiplying the bunch number per vine by the historic OWG maturity testing bunch weight.

The estimates in Figure 2 were determined in the 2000 vintage using the OWG Yield Estimation Kit. The bunch weight used in the initial and revised estimate was based on averaging the previous harvest results from Nassau Estate with OWG’s regional harvest results.

The method of crop estimate for the 2001 and 2002 vintages was identical to that of the 2000 vintage. The SD values for Shiraz tends to be higher than for the other three varieties. This is attributed to the implementation of Regulated Deficit Irrigation (RDI) on Shiraz at Nassau Estate.
Unwanted weather conditions, i.e. rain at flowering, can result in varying degrees of success in targeting reduction of berry size.

Table 1. The mean absolute block error for Nassau Estate from 1999–2002.

<table>
<thead>
<tr>
<th>Vintage</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean absolute block error (%)</td>
<td>37</td>
<td>33</td>
<td>20</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: Stephen Guilbaud-Oulton, OWG.

The calculated mean absolute block error compares the revised estimate and the harvest tonnages and illustrates the degree of accuracy of the crop estimation. The absolute block error is a measure of the difference between the yield calculated from the revised crop estimate and that actually delivered at harvest. The absolute block errors in Table 1 were calculated from the average errors for each block to give a mean absolute block error for each vintage.

Conclusions
Variability between estimated and harvest results has reduced considerably over time. If the time can be allocated to this essential part of the grapegrower’s vintage, yield estimates can become increasingly more accurate.

As demonstrated in Table 1, accurate bunch counting, keeping more information of the harvest and essential good record keeping is essential to estimation accuracy.

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References