New opportunities for sustainable grape thinning

A New Zealand Winegrowers-funded project was conducted over six seasons to trial modified grape harvesters for reducing Sauvignon blanc yield after fruit set.

Introduction

High quality wine production starts in the vineyard by producing grapes with the potential to produce fully flavoured wines. The ability to ripen fruit at a given location and canopy size is largely determined by yield. In a season where yields are predicted to be high, crop reduction is traditionally done by hand thinning after fruit set. This is a labour-intensive and costly exercise. Thinning shortly after fruit set has the advantage in that the potential vine yield has already been determined. This enables growers to optimise yields to maximise the probability of achieving a target fruit composition before the end of the growing season.

Materials and methods

Fruit were removed mechanically from Sauvignon blanc vines in Marlborough using modified grape harvesters (belts were removed and beaters repositioned). Thinning was undertaken shortly after fruit set, when berries were pea sized. Different harvesters were used over the six seasons at five different vineyards. The number of beater rods used, the position of these rods within the canopy, and the pinch of the rods varied between harvesters and seasons. Machine ground speed and beater frequency were adjusted until the desired amount of crop had been removed (Figure 1). Light and heavy rates of thinning were investigated, and a hand thinning treatment was included in the early years. Fruit were collected under the vines (Figure 2), weighed and related to the total vine yield included in the early years. Fruit were removed mechanically from Sauvignon blanc grapes to achieve target yields.

Mechanical thinning reduced crop load, predominantly by reducing berry number per bunch and average berry weight. Thinning generally delayed véraison and the onset of sugar accumulation rates of soluble solids from véraison, and soluble solids concentrations were generally similar to or higher than those of fruit from unthinned control vines at harvest. The differences in the amounts of soluble solids became less pronounced as the berries ripened through to harvest (Figure 4).

Results

At thinning approximately 50% of the reduction in final yield was collected under the vines. The balance of the reduction was caused by the shrivelling of berries and bunches in the canopy and a smaller average final berry size. When the weight of fruit collected in the trays under the vine was expressed as a proportion of vine yield at thinning, a relationship could be developed which suggested that the total vine yield loss at harvest was on average twice that measured under the vine at thinning (Figure 3).

Thinning did not alter the number of bunches per vine. Thinning resulted in lower berry numbers per bunch and lower berry weights. This appeared to result in less compact bunches at harvest.

Thinning generally delayed véraison and the onset of sugar accumulation. However, the lower yields resulted in faster accumulation rates of soluble solids from véraison, and soluble solids concentrations were generally similar to or higher than those of fruit from unthinned control vines at harvest. Thinning was linked with that in the unthinned control vines.

Machine thinning resulted in the removal of significant quantities of bunch trash (Figure 6). This was associated with a general reduction in botrytis bunch rot severity compared with that in the unthinned control vines.

Conclusions

• The use of modified grape harvesters appears to be a practical and cost-effective alternative to hand thinning of Sauvignon blanc grapes to achieve target yields.

• Mechanical thinning reduced crop load, predominantly by reducing berry number per bunch and average berry weight.

• The removal of trash through vine shaking during the thinning process was associated with a general reduction in the severity of botrytis bunch rot.

• Regardless of the method used, thinning advanced the accumulation of sugars and the date at which fruit were harvested.

The use of modified grape harvesters to remove crop after fruit set is a viable method of crop reduction, with potential benefits in botrytis bunch rot control.

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Figure 1. Polyphenol sheathing under the vine row of Sauvignon blanc plants about to be thinned (2009 season).

Figure 2. Thinning lying at the base of the Sauvignon blanc grapevines after mechanical thinning (2011 season).

Figure 3. Relationship between the proportions of Sauvignon blanc fruit removed at thinning and the reduction in yield at harvest. The regression line has been forced through the origin. The difference between the one-to-one relationship (dashed red line) and the fitted (black) line is a reflection of fruit losses caused by shrivelling in the canopy and/or smaller berries as a result of machine thinning. The solid red line shows the expected yield reduction if the yield loss at harvest is twice that removed at thinning.

Figure 4. Influence of method of thinning on changes to soluble solids concentrations (% Brix) of Sauvignon blanc (2011 season).

Figure 5. The estimated degree of botrytis bunch rot severity for the various Sauvignon blanc thinning treatments at harvest (2011 season). The vertical bars are the harvest dates of each treatment at 21.5 °Brix.

Figure 6. Trash from the Sauvignon blanc canopy immediately after thinning (2012 season).