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Thesis title: Impact of various canopy defoliation and anti-transpirant treatments on fruit maturation in grapevines

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Abstract (max 300 words)

Topic, position and objectives:

One of the projections regarding climate change on viticulture indicates that grapevine phenology could be advanced, and susceptibility to quality loss could increase with an earlier maturation period. Attempting to delay veraison, could allow for the maturation period to be shifted to the cooler part of the season. The ratio of Leaf Area to Fruit Weight was investigated into its effects on the maturing Riesling berry, and whether reducing the ratio could delay its maturation. Leaf Area was reduced using various forms of defoliation post-flowering, differing in their position of leaf removal and their intensity. Also, applications of a sticking-spreader agent reducing the transpiration to the vine's canopy were trialled to monitor effects on photosynthetic efficiency and whether the reduced ratio could be mimicked. Maturity sampling revealed the impacts of each treatment on the maturing berries. Also, the possibility to use *in situ* methods of berry analysis was explored, with the trialling of the Multiplex[®] sensor on Riesling berries.

Methods:

Leaf Area was reduced in the weeks following flowering using manual defoliation treatments (SSP and BZD) as well as by machine (MDC). The spreader and sticker agent Nu-Film-P[®] (NAT) was applied post-flowering, and re-applied twice during the period up until veraison. Standard methods of sampling determined grape composition, and harvest data returned the fruit weight parameter, to be compared against estimated leaf area.

Results:

Leaf Area to Fruit Weight ratios were reduced from $1.96\text{m}^2\text{kg}^{-1}$ to 0.39, 1.03, 1.23 and 1.42 for SSP, BZD, MDC and NAT respectively. Proportion of leaves from lateral shoots to those from main shoots was increased most in MDC, and its impacts on grape composition and rate of maturation varied from a similar treatment SSP. Maturity sampling revealed for SSP veraison was delayed by approximately one week, and all other treatments revealed reductions in must sugar content at harvest. Berry size was not significantly reduced.

Main conclusions:

Large reductions in the ratio of Leaf Area to Fruit Weight significantly reduced the sugar content of Riesling berries at harvest. The specific impacts were dependent on the timing of carbohydrate limitation, the position of defoliation, and the level of defoliation. Defoliation by machine revealed decreases in the rate of maturity however was not as effective in delaying the maturation period as the manual methods. NAT application also revealed a reduction in sugar content, and showed similarities in its impacts on grape composition to SSP. *In situ* monitoring of maturity for Riesling shows some promise with the use of the Multiplex[®], however further trialling is needed under favourable weather conditions.

Keywords:

Defoliation, Leaf Area, Fruit Weight, Maturation, Climate Change

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