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Vineyard Leaf Canopy Management: Timing of the First Hedge-Trimming

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Delaying the date of the first hedge-trimming (or 'tip-pruning') is of limited technical value in vineyard canopy management. The impact of the delay on lateral shoot growth and must composition remains marginal within the context of the La Côte vineyard in Switzerland.

PHOTO LEAD. Untrimmed vines in the vineyard of La Côte, Switzerland.

Introduction

In the context of Swiss vineyards, the proper management of vine foliage enables sufficient leaf photosynthetic activity to ensure proper berry ripening whilst maintaining a well-aerated microlimate in the cluster zone to limit the development of fungal diseases. Different vine training techniques exist, influenced by regional traditions and peculiarities. Trellising techniques with erect shoots such as guyot or cordon royat are widely used because they facilitate vineyard upkeep and mechanised work. Once attached to the trellising, the shoots continue to grow longitudinally and require trimming (or tip-pruning) before they sag under their own weight. In Switzerland, this trimming is carried out two to four times per season in order to facilitate access between rows for plant-protection treatments and soil preparation.

The first hedge-trimming usually stimulates the growth of the laterals on the shoots following the removal of the apices. This lateral growth may complicate the management of foliage in the cluster zone and impact the state of health of the leaves and clusters, as well as affecting yield and berry composition[1 2]. Shoot tressage, or braiding, is an alternative that consists in rolling the shoots and wrapping them on the top wire instead of trimming them. This limits the growth of the laterals while having a minimal effect on berry composition, although it is a non-mechanisable, laborious technique (at least as regards the braiding and the removal of the pruning wood)[3 4]. An intermediate solution would be to delay the first trimming – an option currently being explored by Agroscope. The aim of this article is to observe the impact of the timing of the first trimming on secondary-shoot growth, yield and berry composition at harvest for contrasting vintages.

Materials and methods

The viticultural trial took place between 2003 and 2006 in the La Côte vineyard in Switzerland. The local climate is mild, with hot summers but no dry season (code Cfb in the Köppen-Geiger classification)[5]. Materials and methods are described in detail in the full original article[6]. A homogeneous plot of Chasselas grafted onto 3309 C was planted in 1988, and since then has been trained in a single guyot, trimmed to a foliage height of 120 cm, and stripped (harvests in green) each year before cluster closure. Since 2003, the plot has been divided into two blocks (12 rows of around 50 vines each), each undergoing two trimming treatments: a first trimming that is traditional for the region ('end of flowering' stage, BBCH 67-69) and a delayed first trimming ('start of veraison' stage, BBCH 81). The timing of the first trimming was the only factor differing between the two treatments.

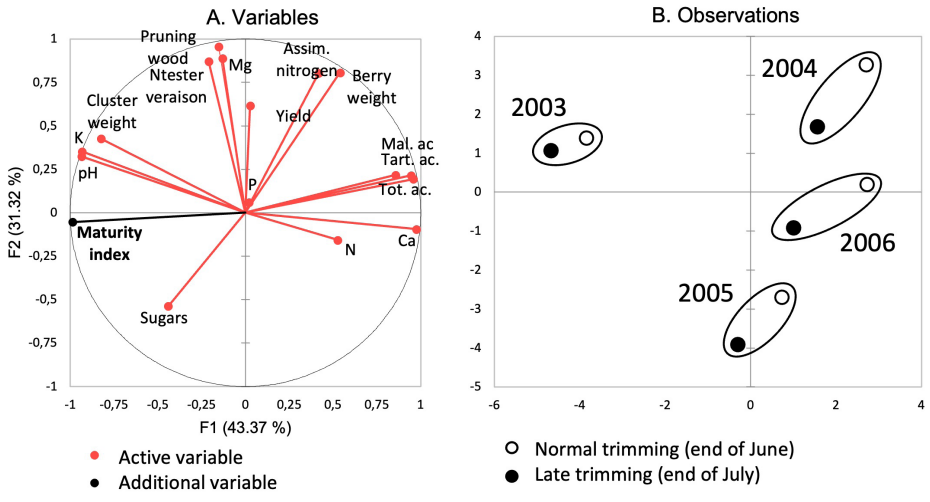

FIGURE 1. Principal component analyses (PCAs). Chart A shows the correlations between the variables measured on the vine and in the musts. Chart B distinguishes between observations as a function of the year and the timing of the first trimming; the closer the dots, the more similar the results of the observations. Maturity index = sugars/total acidity

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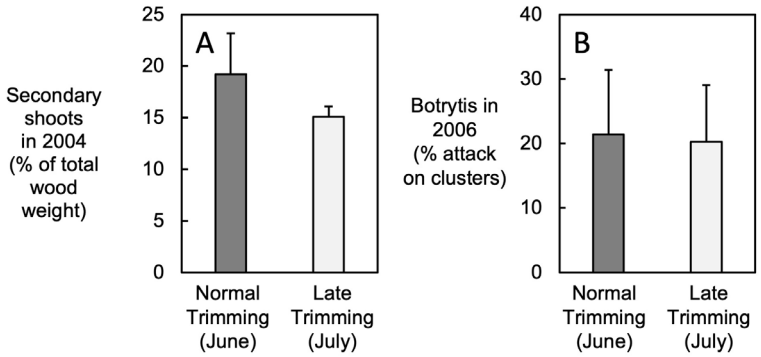

FIGURE 2. Proportion of secondary shoots in the total weight of pruning wood in 2004 (A) and grey mould (*Botrytis cinerea*) on clusters at harvest in 2006 (B) as a function of the timing of the first trimming (late June or late July).

Each year, measurements were carried out on the vine and the musts were analysed to evaluate the impact of the two treatments on the physiological behaviour of the vine. Bud fertility was estimated (except in 2003) and the main mineral elements (N, P, K, Ca, Mg) were analysed on samples consisting of 25 randomly sampled whole leaves per variant at veraison. Samples of 200 berries were weighed and pressed before the harvest to analyse the must via infrared spectroscopy, measuring soluble sugars, total acidity, tartaric and malic acid, pH, and yeast-assimilable nitrogen. The maturity index was calculated by dividing the quantity of soluble sugars by total acidity. Yields were measured at harvest; cluster weight was calculated by dividing harvest weight by the number of clusters. Vine vigour was evaluated by weighing the pruning wood taken from 10 vines. In 2004 and 2005 the secondary shoots were weighed separately to determine their proportion of the total weight of pruning wood; secondary shoots were not measured in 2003 and 2006 as the hot, dry climate of these years led to their inadequate development.

Results and discussion

Results were synthesised using principal component analysis (PCA), which allows 75 % of the information to be displayed (Figure 1). The impact of the climatic conditions of the year in question appears to be greater than that of the timing of the first trimming. A clear distinction between the years was observed: marked by high temperatures, 2003 exhibited an increased must maturity with a lower acidity, whilst 2004 and 2006 showed higher levels of acidity and assimilable nitrogen concentration. In 2005, the musts were characterised by higher soluble sugar levels and a lower assimilable nitrogen concentration. The delayed trimming consistently resulted in smaller berries and musts with a higher pH (+0.02; $p < 0.05$) by virtue of a titratable acidity (-0.4 g tart./L; $p < 0.001$) and lower concentrations of tartaric (-0.1 g/L, $p < 0.001$) and malic acid (-0.2 g/L, $p < 0.01$), but no impact on sugar and assimilable nitrogen content.

The interaction between year and treatment was particularly striking in 2003, when the exceptionally low acidity rendered the impact of the timing of the trimming insignificant. Over four years, average fertility was normal with 1.9 clusters per wood, and the difference in yield between the different trimming timings was negligible ($p = 0.070$). Lateral shoot growth decreased with delayed trimming in 2004 (Figure 2A), but this difference was not observed in 2005 becaused of the reduced vine vigour owing to the demanding climatic conditions – particularly the lower precipitation.

There was no difference attributable to the trimming in the major grey mould attack suffered by grape clusters in 2006, most likely due to a difference in lateral shoot growth too minor to affect the microclimate surrounding the clusters (Figure 2B). There was no fungal attack in 2003, 2004 and 2005. Mineral levels in the leaves at veraison were satisfactory, but low for nitrogen (< 1.9 % DM) and potassium (< 1.5% DM). Only phosphorus levels were slightly affected by the delayed trimming (-13 %; $p = 0.004$).

In conclusion, postponing trimming may be beneficial for limiting lateral shoot growth and reducing foliage overcrowding in excessively vigorous vines. However, the physiological and economic value of this technique is limited to the wettest years, which are more likely to favour lateral shoot growth, and its impact on must composition was marginal.

Conclusions

➡In certain years, delaying the first hedge-trimming helps limit lateral shoot growth and reduce foliage overcrowding in excessively vigorous vines.

➡Delayed trimming caused a reduction of phosphorus in the leaves compared to an earlier trimming.

➡Delayed trimming caused a slight decrease in titratable acidity and an increase in must pH without affecting the accumulation of soluble sugars.

➡Delayed trimming had no implications on either yield or the amount of grey mould at harvest within the context of this trial, even in a year of high fungal pressure such as 2006.

➡Within the context of the La Côte vineyard in Switzerland, the value of a delayed trimming appears to be limited and the implications for must composition are marginal. The greatest impact was exerted by the climatic conditions of the year in question. ■

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Sources: *Article based on the research article 'Gestion de la haie foliaire en viticulture: positionner le premier cisaillage'. (Recherche Agronomique Suisse, 15, 104-108). https://doi.org/10.34776/afs15-104 . Original language of article: French.*

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