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Defoliation in 'Pinotage' during the harvests 2014/15 and 2015/16 in Dom Pedrito-RS

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Abstract. The objective of this study was to evaluate the effect on must from defoliation in 'Pinotage' in a property in the region Dom Pedrito, conducted in espalier and from East / West direction. The work was performed by the Nucleus of Study, Research and Extension in Oenology (NEPE^2); in 2014/2015 and 2015/2016 harvests. The treatments were: T1 – control; T2 – Defoliation in thenorth; T3 – Defoliation in the south and; T4 – Defoliation South and North. The response variables were analyzed by infrared spectrometry fourier transform (FTIR); these analyzes in the must were: total soluble solids (TSS) in °Brix, pH, potassium and gluconic acid. The experimental design was a randomized block design with four replications and 20 plants per plot. The results were submitted to analysis of variance (F test) and multiple comparison of averages by Tukey test at 5% probability. TSS is kept equal in the 2014/15 crop, but in the 2015/16 season were different and the treatment T4 (Defoliation North and South); significantly higher, followed by treatment T3 (Defoliation to the south).

1. Introduction

Several factors can influence the quality of a fruit such as climatic conditions, soil types, genetic potential of the cultivar and agronomic management as dry pruning and green pruning (defoliation). The green pruning is performed on vines with the goal of balancing the vegetative development and the production in order to improve the quality of grape [1].

This operation is done for various purposes and in various ways. It is used to supplement the dry pruning during the formation of the plant to facilitate penetration of light, air and heat, to guarantee the fertilization of flowers to decrease the incidence of disease and to save fungicides. The bud removal, topping and defoliation are green pruning methods that interfere with the characteristics of the canopy. The function of the leaf removal consists in removing sheets mainly located near the bunches to provide aeration and insolation to fruit maturation promoting favourable conditions, having care to not remove more than 50% thereof.

The exposure of the bunches to solar radiation is related to greater accumulation of soluble solids, being higher the sugar content in grapes, important in the maturation not only by the amount of alcohol that is derived to the wine but serve as a source for other compounds such as polyphenols, anthocyanins and those related to the aroma. This practice also eliminates potential contamination by gray rot and these can transform sugar into glycerides and gluconic acid producing enzymes that catalyze the oxidation of phenolic compounds.

In temperate climates it is recommended to carry out the removing of branches and defoliation to increase exposure of vines intended for wine making to solar radiation in order to stimulate the synthesis of phenolic compounds, among other metabolites, providing better color and structure to the drink, especially to red wines. Wines produced with grapes infected become sensitive to oxidation and bacterial contamination, changing the taste and making them unsuitable for aging [2].

The objective of this study was to evaluate the effect of defoliation on 'Pinotage' on the wine from the harvest 2014/15 and 2015/16 on a property in the region of Don Pedrito (Campaign Gaucha) in crops where the conduction system in espalier it is in East / West direction.

2. Materials and methods

This work was conducted by the Nucleus of Study, Research and Extension in Oenology (NEPE^2) of the Federal University of Pampa (UNIPAMPA); in harvests 2014/2015 and 2015/2016; and the defoliation of the cultivar Pinotage was held at the phenological stage 31 (pea grain) of Eichhorn & Lorenz [3]. The treatments were: T1 – control without defoliation; T2 – Defoliation in the north; T3 – Defoliation to the south and; T4 – Defoliation South and North. The response variables were analyzed by infrared spectrometry fourier transform (FTIR); and these analyzes in the must were: total soluble solids (TSS) expressed in °Brix, pH, gluconic acid and collected grape must potassium before vinification. The design used was randomized blocks with four replications and 20 plants per plot. The results were submitted to analysis of variance (ANOVA) and the averages were compared by the comparison test averages of Tukey at 5% probability [4–6].

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Table 1. Total Soluble Solids of must from the fruits of cultivar Pinotage, submitted or not to defoliation.

Treatments*	TSS (°Brix) – harvest 2014/2015	TSS (°Brix) – harvest 2015/2016
T1	15,97 a**	19,17 c
T2	18,83 a	18,50 d
T3	19,37 a	19,60 b
T4	19,07 a	22,47 a

* T1 = without defoliation; T2 = Defoliation in the north; T3 = Defoliation to the south and; T4 = South and North Defoliation. ** Same letter in the column do not differ statistically by Tukey test at 5% probability.

Table 2. pH from the fruits of cultivar Pinotage, submitted or not to defoliation.

Treatments*	pH – harvest 2014/2015	pH – harvest 2015/2016
T1	3.45 a	3.37 b
T2	3.52 a	3,04 d
T3	3.51 a	3,08 c
T4	3.52 a	3,42 a

* T1 = without defoliation; T2 = Defoliation in the north; T3 = Defoliation to the south and; T4 = South and North Defoliation. ** Same letter in the column do not differ statistically by Tukey test at 5% probability.

Table 3. Potassium ($g\,L^{-1}$) from the fruits of cultivar Pinotage, submitted or not to defoliation.

Treatments*	Potassium – harvest 2014/2015	Potassium – harvest 2015/2016
T1	1999.66 a	1281.06 b
T2	1502.66 a	1393.33 a
T3	1497.33 a	838.00 c
T4	1450.33 a	828.33 c

* T1 = without defoliation; T2 = Defoliation in the north; T3 = Defoliation to the south and; T4 = South and North Defoliation. ** Same letter in the column do not differ statistically by Tukey test at 5% probability.

3. Results and discussion

The TSS (Table 1) remained statistically similar in the 2014/15 crop, but in the 2015/16 season were different and the treatment T4 (Defoliation South and North) was significantly higher followed by treatment T3 (Defoliation in the south).The pH, total acidity and potassium content (Tables 2 and 3) also showed statistically equal in the 2014/15 crop. On the other hand, in the 2015/16 season, the pH and potassium content values were statistically different between the most treatments. Remained superior the treatment T4 (Defoliation North and South), followed by T1 (control,) for pH and potassium content the statistically superior treatment was T2 (defoliation in the north).

The gluconic acid values were different in the two seasons, in the harvest 2014/15the treatment T2 (defoliation in the north), T3 (Defoliation to the south) and T4 (Defoliation South and North) were higher than $0.5\,g\,L^{-1}$, value that can point out that the grapes could have had some kind of sanity problem, along the development of the fruit in the field, according to [7]. In the 2015/16 harvest, the T4 (Defoliation South and North) remained significantly superior to other treatments, but as expected for grapes (Table 4).

Even having suffered from weather problems, the harvest 2015/16, showed similar results to the previous harvest as the pH values. One of the characteristics of the cultivar Pinotage is your regular pH and its good adaptation to climate similar to its home country, South Africa.

Table 4. Gluconic Acid ($L^{-1}\,g$) from the fruits of cultivar Pinotage, submitted or not to defoliation.

Treatments*	Gluconic Acid – harvest 2014/2015	Gluconic Acid – harvest 2015/2016
T1	0.36 b	0.20 b
T2	1.00 a	0.20 b
T3	1.20 a	0.03 c
T4	0.96 a	0.43 a

* T1 = without defoliation; T2 = Defoliation in the north; T3 = Defoliation to the south and; T4 = South and North Defoliation. ** Same letter in the column do not differ statistically by Tukey test at 5% probability.

4. Conclusion

Under the conditions of this experiment, it is concluded that the grape must 'Pinotage' where defoliation was carried out in south direction showed in the second season (2015/2016) higher levels of soluble solids.

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