

## INFLUENCE OF 'PINOTAGE' DEFOLIATION ON FRUIT AND WINE QUALITY

Authors: Marcelo de Souza SOARES<sup>1</sup>, Pedro Paulo PARISOTO<sup>1</sup>, Nádia Cristiane Alves VIANNA<sup>1</sup>,  
Bruna Laís HAMM<sup>1</sup>, Daniel Pazzini Eckhardt<sup>1</sup>, Lília Sichmann HEIFFIG-DEL AGUILA<sup>2</sup>,  
Juan SAAVEDRA DEL AGUILA<sup>1\*</sup>

<sup>1</sup> University Federal of Pampa (UNIPAMPA), Cep 96450-000, Dom Pedrito, RS, Brazil

<sup>2</sup> Embrapa Temperate Agriculture, Pelotas, RS, Brazil

\*Corresponding author: [juanaquila@unipampa.edu.br](mailto:juanaquila@unipampa.edu.br)

### Abstract:

**Context and purpose of this study** - Among the different management techniques in Viticulture, which have been developed with the purpose of optimizing the interception of sunlight, the photosynthetic capacity of the plant and the microclimate of the clusters, especially in varieties that show excess vigor, the management of defoliation presents great importance. The defoliation consists of the removal of leaves that cover or that are in direct contact with the curls, which can cause physical damages in the berries, and aims to balance the relation between part area and number of fruits, providing the aeration and insolation in the interior of the vineyard, as well as reduce the incidence of rot in order to achieve greater efficiency in phytosanitary treatments and quality musts. The objective of this work was to evaluate the effect of defoliation on the physical-chemical parameters of grapes, musts and wine from the 'Pinotage' cultivated in Dom Pedrito, Region of "Campanha", "RS", Brazil, in a commercial vineyard planted in the East-West direction .

**Material and methods** - The study was carried out by the Nucleus of Study, Research and Extension in Enology (NEPE<sup>2</sup>), of the Bachelor's Degree in Oenology of UNIPAMPA. The work was carried out in the 2017/18 harvest, with the grapes coming from a commercial vineyard cultivated in a simple vineyard, with a height of 1.0m of the first wire to the ground, 0.5m height of the leaf area, spacing of 1.3m between plants and 3.0m between rows, adding 84 plants. Defoliation was carried out in the color change of the berries, being divided into four treatments, each treatment with 21 plants, where T1 Control (no defoliation of the vine); Defoliation to the North; T3 Defoliation to the South and; T4 Defoil South and North. Microvinifications were done with temperature control and five days of maceration. It was evaluated in the must: total soluble solids, density ( $\text{g L}^{-1}$ ), pH, reducing sugars ( $\text{g L}^{-1}$ ), Gluconic Acid ( $\text{g L}^{-1}$ ) and Potassium Content ( $\text{mg L}^{-1}$ ); in the wine the following variables were evaluated: Alcohol (% v/v), Total Acidity ( $\text{meq L}^{-1}$ ), Density at 20°C, pH, Volatile Acidity ( $\text{meq L}^{-1}$ ), Glycerol ( $\text{g L}^{-1}$ ), Tartaric Acid ( $\text{g L}^{-1}$ ), Malic Acid ( $\text{g L}^{-1}$ ), Color Intensity and Tint. The data were submitted to the Tukey averages comparison test at 5% probability.

**Results** – According to the results we can verify that the treatments with defoliation did not influence the quality of the grape must, but the defoliation in the North direction, did decrease the glycerol content of the wine.

**Acknowledgments:** We would like to thank "Fundação de Amparo à Pesquisa do Estado do Rio Grande do Sul" ("FAPERGS/Edital 01/2019 – Auxílio para Participação em Eventos – APE") for the financial support for participation to the author Juan SAAVEDRA DEL AGUILA, in the 21<sup>st</sup> GIESCO International Meeting (Group of International Experts for Cooperation on Vitivinicultural Systems): 2019, Thessaloniki, Greece. We would like to thanks to the winegrower Mr. Adair Camponogara and the Citropack and Amazon Group.

**Key words:** *Vitis vinifera* L., Carbohydrates, Photosynthesis, Viticulture.

### 1. Introduction.

Núcleo de Estudo, Pesquisa e Extensão em Enologia (NEPE<sup>2</sup>) / UNIPAMPA - Campus Dom Pedrito

## DEFOLIATION IN THE QUALITY OF THE 'PINOTAGE' GRAPE AND WINE IN THE DOM PEDRITO REGION



**unipampa** Bacharelado em Enologia  
Universidade Federal de Pampa

Marcelo de Souza SOARES<sup>1</sup>, Pedro P. PARISOTO<sup>1</sup>, Nádya Cristiane Alves VIANNA<sup>1</sup>, Bruna Laís HAMM<sup>1</sup>, Daniel Pazzini ECKHARDT<sup>1</sup>, Lilia Sichmann HEIFFIG-DEL AGUILA<sup>2</sup>, Juan SAAVEDRA DEL AGUILA<sup>1</sup>



### ABSTRACT

The grape is characterized as a demanding species in cultural dealings and to reach optimal conditions at the time of harvest it is fundamental that the management techniques are appropriate the characteristics of the region. Among the different management techniques that have been developed with the purpose of optimizing the interception of sunlight, the photosynthetic capacity of the plant, and the microclimate of the clusters, especially in varieties that show an excess of vigor, the management of defoliation is of great importance. Defoliation consists of the removal of leaves that cover or that are in direct contact with the curls, which can cause physical damages in the berries; with the objective of balancing the relationship between part area and number of fruits, providing aeration and sunlight in the interior of the vineyard, as well as reducing the incidence of rot in order to obtain greater efficiency in the treatments and musts of superior quality. The objective of this work was to evaluate the effect of defoliation on the physical-chemical parameters of grapes, musts and wine from 'Pinotage' de Dom Pedrito, Region of Campanha, Rio Grande do Sul, RS, in a vineyard in the East-West direction. The work was carried out in the 2017/18 harvest, the grapes were harvested in the respective year, coming from a commercial vineyard cultivated in single vineyard, with height of 1.6m of the first wire to the ground, 0.5m of leaf area, spacing of 1.3m between plants and 3.0m between rows, adding 84 plants. The leaf strips were divided into four treatments, each treatment with 21 plants, where T1 Control (no defoliation of the grapevine), 2 Leaflessness to the North, 3 Leaflessness to the South and 4 Leaflessness to the South and North. Microvinifications were done with temperature control and five days of maceration. It was evaluated The total soluble solids, pH, reducing sugars, density, tartaric acid, malic acid, total acidity, volatile acidity, hue and color intensity were evaluated. According to the results we can verify that the treatments with defoliation did not influence the quality of the musts, but the defoliation in the North direction, decreases the glycerol contents of these wines.

### INTRODUCTION

The growing demand for quality Brazilian fine wines has led the Brazilian wine industry to expand the vineyards to the Campanha region, located in the south of Brazil, on the border with Uruguay. In this region, the climate is drier and brighter than the Serra Gaúcha (POTTER et al., 2010). The main characteristics are the altitude ranging from 75 to 420 meters and flat topography, annual average temperature of 17.9 °C, annual sunshine, on average 2187.9 hours, annual rainfall, an average of 1300 mm and thermal amplitudes which reach 15°C (COPELLO, 2013). The Southern Campanha comprising Dom Pedrito, Itapé, Lavras do Sul, Ilhota Negra and Azequim, in 2015 had a cultivated area of vines of up to three years old of 13.66 ha, that is, new vineyard deployments , with a total area of 224.58 hectares already planted in the year 2015 (VITICOLA REGISTRATION, 2015). In the municipality of Dom Pedrito - RS, the production of fine grapes began in the 1990s, with a small group of producers under the guidance of a renowned company in the neighboring city, currently the grapes produced in the municipality give rise to wines with national and international awards , representing a culture to be extensively explored and studied in order to raise the quality of the raw material produced here (LANGHECKER et al., 2012). In this context, the objective of this study was to evaluate the effect of defoliation on the physico-chemical parameters of must and Pinotage wine. The study was carried out in a commercial vineyard during the 2017/2018 harvest in the city of Dom Pedrito, in the region of the Gaúcha Campanha (RS), seeking to answer whether the practice of defoliation actually influences the quality of wine.

### MATERIAIS AND METHODS

This study was delineated to investigate the influence of the defoliation of the cultivar 'Pinotage'. The vineyard of 15 hectares with the following varieties: 'Pinotage', 'Cabernet Sauvignon', 'Tannat' and 'Chardonnay', is located in the municipality of Dom Pedrito - RS, latitude 31 ° 1'26.96 "South 54 ° 36' 16.73 "West and average altitude of 260m. The climate of the region is classified as humid subtropical, with relatively warm and dry summers. The average indexes of the main climatic data are: Air temperature - 17.8°C; Rainfall - 1388 mm; Air humidity - 76%; Insolation - 2,372h (MIELE and MILO, 2007). The vineyard where the experiment was installed is in the East West direction, it is conducted in a simple coplanar, with a height of 0.90m from the first wire to the ground, 0.60m of leaf area, spacing of 1.3m between plants and 3m between rows, totaling 84 plants for the whole experiment. The cultural treatments (green pruning, defoliation, setting, etc.) and phytosanitary control were performed uniformly throughout the experimental area. Four treatments were performed, each treatment with 21 plants. All plants were stripped the same day. The treatments were: T1 - Control (without defoliation on the vine), T2 - North defoliation (leaves were removed from the north side), T3 - South defoliation (leaves were removed from the north side), T4 - South and North defoliation (leaves were removed from the north and south sides).

### RESULTS AND DISCUSSIONS

The solar radiation and the aeration of the curls tend to improve the maturation conditions of the grapes, raising the anthocyanins and sugar contents of the berries. However, in this work, according to the results found for the analysis of musts (Tables 1 and 2) collected prior to vinification, we observed that the defoliation did not influence the quality of the must. Gluconic acid can be used as an indicator tool for rot in grape (noble rot and gray rot are caused by fungi). For the variable density, there was also no statistical difference between the evaluated treatments. Also, taking into account the more traditional variables for winemaking, it was observed that the wort where no defoliation was performed (T1), in general, showed a more advanced maturation, that is, the must higher soluble solids content (22.13° Brix), higher density (1,094,33 mg), higher reducing sugars (230.30 gL<sup>-1</sup>) lower pH values (3.60) and lower gluconic acid content (0.38). Regarding the analysis of the wine (Table 3), we noticed that practically all the variables underwent modifications. That is, in this case the management of defoliation provided an increase in total acidity, density, reducing sugars content, tartaric acid and malic acid contents, intensity and color tone. On the other hand, it reduced the levels of volatile acidity, glycerol and pH. The pH is important, mainly due to its application in the conservation of wines. Low pH values between 3.1 and 3.5 provide products that will have longer longevity, since it does not offer favorable conditions for the development of bacteria. The alcohol content did not differ between treatments. The results showed that the acetic acid contents are in agreement with the recommended ones, presenting low values, indicating that the management practices of the plants and the technology used in its elaboration were correct. With regard to malic acid it can be noted that a reduction in its concentration occurred during the course of the analyses. The concentration of glycerol decreased over time. Regarding the color of the wines, the treatment in vines that were submitted to defoliation on the South side, presented greater intensity of color (2.040). For color tonality, the highest value found was (0.713) where defoliation was performed in the North.

Table 1 - Physical-chemical analysis of the 'Pinotage' grape must from the East West vineyard, managed without defoliation, collected on 01/01/18, in the 2017/18 harvest.

Treatment	SS (°Brix)	Density (mg)	RS (g/L)	pH	GA (g/L)
T1 - Control	22,13	1,094,33	230,30	3,60	0,38
T2 - North	22,13	1,094,33	230,30	3,60	0,38
T3 - South	22,13	1,094,33	230,30	3,60	0,38
T4 - South and North	22,13	1,094,33	230,30	3,60	0,38

Table 2 - Physical-chemical analysis of the 'Pinotage' must from the East West vineyard, managed without defoliation, quantified on 02/01/18, prior to vinification. Harvested in the 2017/18 harvest.

Treatment	SS (°Brix)	Density (mg)	RS (g/L)	pH	GA (g/L)
T1 - Control	22,13	1,094,33	230,30	3,60	0,38
T2 - North	22,13	1,094,33	230,30	3,60	0,38
T3 - South	22,13	1,094,33	230,30	3,60	0,38
T4 - South and North	22,13	1,094,33	230,30	3,60	0,38

Table 3 - Physical-chemical analysis of the 'Pinotage' wine from the East West vineyard, managed without defoliation, quantified on 02/01/18, prior to vinification. Harvested in the 2017/18 harvest.

Treatment	TA (g/L)	Density (mg)	RS (g/L)	pH	VA (g/L)	GA (g/L)	MA (g/L)	TA (g/L)	Color Intensity	Color Tonality
T1 - Control	10,00	1,094,33	230,30	3,60	0,38	0,38	0,38	0,38	2,040	0,713
T2 - North	10,00	1,094,33	230,30	3,60	0,38	0,38	0,38	0,38	2,040	0,713
T3 - South	10,00	1,094,33	230,30	3,60	0,38	0,38	0,38	0,38	2,040	0,713
T4 - South and North	10,00	1,094,33	230,30	3,60	0,38	0,38	0,38	0,38	2,040	0,713

<sup>1</sup>Universidade Federal de Pampa, 96450-000 Dom Pedrito, Brazil. \* Corresponding author: [juanaquila@unipampa.edu.br](mailto:juanaquila@unipampa.edu.br) <sup>2</sup>Embrapa Temperate Agriculture, Pelotas, RS, Brazil  
**ACKNOWLEDGEMENTS:** We would like to thank "Fundação de Amparo à Pesquisa do Estado do Rio Grande do Sul" (FAPERGS/Edital 01/2019 - Auxílio para Participação em Eventos - APE) for the financial support for participation to the author Juan SAAVEDRA DEL AGUILA, in the 21st G/ESCO International Meeting (Group of International Experts for Cooperation on Vitivincultural Systems); 2019, Thessaloniki, Greece. We would like to thanks to the winegrower Mr. Adair Campoengara and the Citropack and Amazon Group.

