

## Fertilizer of bovine and ovine origin in 'Merlot' vines in Dom Pedrito-RS

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**Abstract.** Despite the vine adaptation to different soil types, most are found in soils with low nutrient supply, requiring corrections. The organic fertilizer facilitates the absorption of nutrients and improve soil structure. The objective was to evaluate the effect of organic fertilization with bovine and ovine manure on growth and totalchlorophyll content of 'Merlot' vines grafted on three different rootstocks. The experiment was conducted by the Nucleus of Study, Research and Extension in Oenology (NEPE<sup>2</sup>) with the variety 'Merlot' VCR1 clone. The treatments were applied in the rootstock '161.49' 420-A 'and' Paulsen 1103', and used manure of bovine and ovine origin, totaling 12 treatments. Were evaluated the plant height (cm) and total chlorophyll (Falker clorofiLOG<sup>®</sup>). The treatments at the rootstock 'Paulsen 1103' showed greater height of 'Merlot' clone VCR1, followed by the rootstock '161.49' and '420A'. But the treatments with the rootstock 'Paulsen 1103' showed less chlorophyll in the leaves of 'Merlot' clone VCR1 compared to other treatments. Preliminarily it was concluded that the use of manure from bovine and ovine origin on the vine 'Merlot' clone VCR1 on the rootstocks 'Paulsen 1103', '420A' and '161.49', present in the leaves higher total chlorophyll content.

### 1. Introduction

The vine, though adapt to various types of soil, productive performance is better in those with good ability of nutrients. However, most of the vineyards are on soils that have some nutritional limitation, and then necessary corrections so that the plants are able to express their productive potential [1].

As is known, the cultivation of the vine was easily adapted in the Campanha Gaucha [2], but for an excellent crop in this region, as in other productive areas, many agrochemicals are used, from fertilization to phytosanitary treatments, which, over the time, can lead to toxicity to soil, water and plants. Thus, the organic fertilizer is a way to reduce the use of agrochemicals, improving soil structure, and is an alternative to reduce costs. Also, the production of livestock in the region o Campanha Gaucha is widespread, so fertilizer derived from animal manures can be used in viticulture.

Organic fertilizers can be considered of plant and animal origin. The manure are the better known fertilizer of animal origin, composed of solid and liquid excrements of the animals, but these fertilizers can also be mixed with plant residues. Thus, the organic fertilizer of animal origin are good nutrient suppliers, by having phosphorus (P) and potassium (K) readily available and nitrogen (N) is available according to the ease of degradation of compounds [3].

Organic fertilizers can be applied on the soil surface, but the decomposition and nutrient release may be less than

if applied in pits, but the cost of application is considered lower, and no chances to cut the roots of the vines, which they may end up causing incidences of root diseases [4].

The 'Merlot' is the vine most cultivated in France and more widely spread throughout the world. Caste is very heterogeneous; biotypes that compose it differ from each other by its fertility or the formation of the bunch. It is possible to produce a wine with a certain finesse and typicality, of ruby red color very intense and slightly herbaceous taste, alcoholic, fruity and aromatic, tendentially low acidity. In the case of VCR1 clone, it has a oenological potential for wines o international taste, not herbaceous, fruity and good color [5].

Records show that in 1920 there were already the cultivation of 'Merlot' in Caxias do Sul-RS, Brazil, one of the main varieties o redgrapes in Rio Grande do Sul from the 1970's. The 'Merlot' adapted in the south, has abundant crops, reaching 20° Brix in Serra Gaucha, but in the Campanha Gaucha can reach 24° Brix, and has more prone to attack by mildew [6].

For the best cultivation of vines, and its features, rootstocks are used, where can be mentioned the rootstocks '420A', characterized by being little vigorous, and having difficulty for rooting, used with cultivars for fine wines. The '161.49', rootstock that has similar characteristics to the '420A', but it is not widespread, both are derived from the intersection of *Vitis berlandieri* x *Vitis riparia*. But the rootstock 'Paulsen 1103' is vigorous, has ease for rooting and also handle grafting, and has high tolerance to fusarium, is very widespread in southern Brazil, and derived from the intersection of *Vitis berlandieri* with *Vitis rupestris* [7,8].

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The objective was to evaluate the effect of organic fertilization with bovine and ovine manure on growth and chlorophyll content of vines 'Merlot' clone VCR1 grafted on three different rootstocks ('161.49', '420A' and 'Paulsen 1103').

## 2. Materials and methods

The experiment was conducted by the Nucleus of Study, Research and Extension in Oenology (NEPE<sup>2</sup>) in the experimental vineyard of the Federal University of Pampa (UNIPAMPA)-Campus Dom Pedrito, implemented in the second half of 2014, with the variety 'Merlot' clone VCR1.

The treatments were:

- T1: 'Merlot' clone VCR1 + rootstock '161.49';
- T2: 'Merlot' clone VCR1 + rootstock '161.49' + 1 Kg of bovine manure;
- T3: 'Merlot' clone VCR1 + rootstock '161.49' + 1 Kg of ovine manure;
- T4: 'Merlot' clone VCR1 + rootstock '161.49' + 1/2 Kg of bovine manure + 1/2 Kg of ovine manure;
- T5: 'Merlot' clone VCR1 + rootstocks '420A';
- T6: 'Merlot' clone VCR1 + rootstocks '420A' + 1 Kg of bovine manure;
- T7: 'Merlot' clone VCR1 + rootstocks '420A' + 1 Kg of ovine manure;
- T8: 'Merlot' clone VCR1 + rootstocks '420A' + 1/2 Kg of bovine manure + 1/2 Kg of ovine manure;
- T9: 'Merlot' clone VCR1 + rootstock 'Paulsen 1103';
- T10: 'Merlot' clone VCR1 + rootstock 'Paulsen 1103' + 1 Kg of bovine manure;
- T11: 'Merlot' clone VCR1 + rootstock 'Paulsen 1103' + 1 Kg of ovine manure;
- T12: 'Merlot' clone VCR1 + rootstock 'Paulsen 1103' + 1/2 Kg of bovine manure + 1/2 Kg of ovine manure.

The total were 12 treatments in a factorial scheme (3 × 4) (rootstock × manure).

It was performed 4 applications of decomposed manure around the vines in September and October of 2015, and in January and February of 2016.

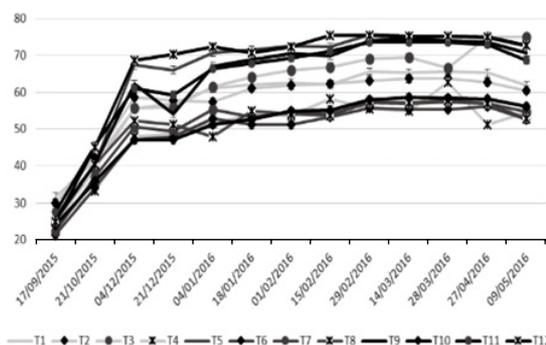
We evaluated the plant height (cm) and chlorophyll (Falker clorofiLOG<sup>®</sup>). It was held the analysis of variance (ANOVA) and when necessary the comparison test of Tukey averages at 5% of probability [9].

## 3. Results and discussion

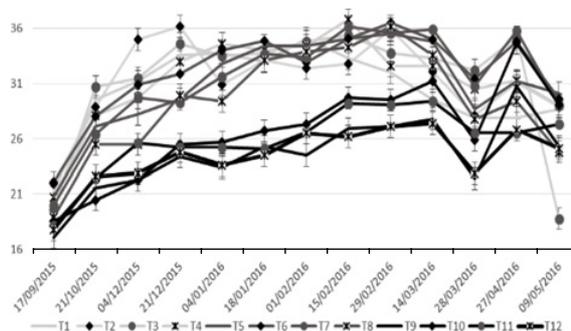
Through the results of the analyzes, it can be observed that although some variances, the treatments T9, T11, T12, with the exception of T10, that is, those with the rootstock 'Paulsen 1103' showed greater height of 'Merlot' clone VCR1, followed by rootstock '161.49' (T1, T2, T3 and T4) and '420A' (T6, T7 and T8), and T5 had the same height as the treatments 'Paulsen 1103', as shown in Fig. 1.

According to the mean comparison test used among all treatments, the T12 had the highest height, so it can be said that with the consortium of bovine and ovine manure, the growth of the vine 'Merlot' clone VCR1 under rootstock 'Paulsen 1103' is greater.

The height of analysis held on 10/21/2015, 1/18/2016, 02/01/2016 and from 02/29/16, had no significant difference between treatments.



**Figure 1.** Height (cm) of the different treatments. T1: 'Merlot' clone VCR1 + rootstock '161.49'; T2: 'Merlot' + '161.49' + 1 Kg of bovine manure; T3: 'Merlot' + '161.49' + 1 Kg of ovine manure; T4: 'Merlot' + '161.49' + 1/2 Kg of bovine manure + 1/2 Kg of ovine manure; T5: 'Merlot' + '420A'; T6: 'Merlot' + '420A' + 1 Kg of bovine manure; T7: 'Merlot' + '420A' + 1 Kg of ovine manure; T8: 'Merlot' + '420A' + 1/2 Kg of bovine manure + 1/2 Kg of ovine manure; T9: 'Merlot' + 'Paulsen 1103'; T10: 'Merlot' + 'Paulsen 1103' + 1 Kg of bovine manure; T11: 'Merlot' + 'Paulsen 1103' + 1 Kg of ovine manure; T12: 'Merlot' + 'Paulsen 1103' + 1/2 Kg of bovine manure + 1/2 Kg of ovine manure.



**Figure 2.** Total chlorophyll of the leaves from different treatment. T1: 'Merlot' clone VCR1 + rootstock '161.49'; T2: 'Merlot' + '161.49' + 1 Kg of bovine manure; T3: 'Merlot' + '161.49' + 1 Kg of ovine manure; T4: 'Merlot' + '161.49' + 1/2 Kg of bovine manure + 1/2 Kg of ovine manure; T5: 'Merlot' + '420A'; T6: 'Merlot' + '420A' + 1 Kg of bovine manure; T7: 'Merlot' + '420A' + 1 Kg of ovine manure; T8: 'Merlot' + '420A' + 1/2 Kg of bovine manure + 1/2 Kg of ovine manure; T9: 'Merlot' + 'Paulsen 1103'; T10: 'Merlot' + 'Paulsen 1103' + 1 Kg of bovine manure; T11: 'Merlot' + 'Paulsen 1103' + 1 Kg of ovine manure; T12: 'Merlot' + 'Paulsen 1103' + 1/2 Kg of bovine manure + 1/2 Kg of ovine manure.

In Figure 2, it can be seen that the treatments with the rootstocks '161.49' and '420A', that is, the treatments T1, T2, T3, T4, T5, T6, T7 and T8 have a higher index of total chlorophyll in leaves of 'Merlot' clone VCR1 compared to treatments T9, T10, T11 and T12 ('Paulsen 1103').

The treatments T1, T5 and T9, ie those without application of bovine manure and ovine manure, total chlorophyll was shown to be inferior in almost half of the evaluations conducted throughout the experiment. But the analysis held on 09/17/2015, 10/21/2015, 12/21/2015, 01/18/2016, 02/01/2016, 02/29/2016, 03/28/2016 e 05/09/2016, had no significant difference between treatments.

A study in the third season of Rubi cultivar, submitted to treatment with different numbers of leaves per branch, the average of chlorophyll was 41.38 [10]. In

an experiment where were used seedlinds, the total chlorophyll content ranged from 39.7 in 'Paulsen 1103', 51.23 in 'Cabernet Sauvignon and 57.9 in' Isabella [11]. Thus, one can say preliminarily that the total chlorophyll content in the leaves of 'Merlot' in its first year, which reached 38 in some treatments, presents suitable chlorophyll content, when compared with 'Ruby' and 'Paulsen 1103'.

#### 4. Conclusion

Based on preliminary research results, it is concluded that using fertilizers from bovine and ovine origin together, there is a greater growth of 'Merlot' clone VCR1 with rootstock 'Paulsen 1103' compared with the rootstocks '161.49' and '420A'. And the use of manure of bovine and sheep origin on the vine 'Merlot' clone VCR1 on the rootstocks 'Paulsen 1103', '420A' and '161.49', present in the leaves higher chlorophyll content.

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