

CULTIVATION OF GRAPES CHARDONNAY IN SOILS WITH MANAGEMENT PRACTICES BIODYNAMIC AND CONVENTIONAL

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Abstract:

Context and purpose of the study - The cultivation of grapes, can be accomplished with the use of different systems and practices of agricultural management, the choice of the system to be followed in the vineyard, depends on the conditions of available resources, these being: natural, economic, social, cultural and territorial. As well, it is relevant to know the characteristics of the soil of the vineyard. In the last decade, has been recurrent use of agricultural practices which date back to milinares traditions, with the aim of promoting a recovery of soil and lead the management of cultivation with less damage to the ecosystem. The study here, aimed to quantify the environmental impacts caused in the use of nutrients in conventional tillage and of grapes in the biodynamic agricultural properties in the state of Rio Grande do Sul- Brazil.

Material and methods - Soil samples were collected from vineyards with a conventional and biodynamic management of Chardonnay vine cultivation system. The soil samples were collected in the vines line of 0-20, and 08 samples were randomly sampled in each hectare of the vineyard. Then, the chemical analysis was performed using the Rolas methodology and soil quality analysis to identify fertility and humification to measure the environmental impact caused in the soil.

Results - The results showed that the use of the soil analysis is an important tool for monitoring the vineyard, mainly in relation to the climatic conditions of the region winery in study. The analysis showed that the soil has the capacity to retain nutrients, capillarity, thickness, heat emission, exposure to the sun, physical properties and, especially, control of water supply, a determinant factor for the good quality of vinífera. The study concluded that the biodynamic contribute to fertility and the reduction of soil acidity. In addition, identified that the production of inputs for the treatment of planting, the agricultural unit, allows a better interaction with the environment and the use of raw materials and waste.

Keywords: environmental impact, soil analysis, fertility, cropping system, vineyard.

1. Introduction.



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Introduction & Objective

The cultivation of grapes, can be accomplished with the use of different systems and practices of agricultural management, the choice of the system to be followed in the vineyard, depends on the conditions of available resources, these being: natural, economic, social, cultural and territorial. As well, it is relevant to know the characteristics of the soil of the vineyard. In the last decade, has been recurrent use of agricultural practices which date back to milinares traditions, with the aim of promoting a recovery of soil and lead the management of cultivation with less damage to the ecosystem. The study here, aimed to quantify the environmental impacts caused in the use of nutrients in conventional tillage and of grapes in the biodynamic agricultural properties in the state of Rio Grande do Sul- Brazil.

Methodology

The fertility and humification to measure the environmental impact caused in the soil. Soil samples were collected from vineyards with a conventional and biodynamic management of Chardonnay vine cultivation system. The soil samples were collected in the vines line of 0-20, and 08 and 10 samples were randomly sampled in each hectare of the vineyard. Then, the chemical analysis was performed using the Rolas methodology and soil quality analysis to identify. Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) software, comparing mainly the two sound groups of the era (vineyards and native forest), using the Student's T test, with significance of 10%. For attributes that did not present homogeneity of variance, the non-parametric Mann Whitney method was used.

Photo 1- Collection of soil in sample vineyards



Source: Research, 2018

The region of Serra Gaúcha is located, mainly, in the Geomorphological region of the State of RS known as "Encosta da Serra do Sudeste". The relief is predominantly wavy to wavy fort, characterizing a transition between the so-called "Planalto Gaúcho" and the Central Depression. The vegetation is composed by Semideciduous Seasonal Forest, with some contact with Araucaria Forest. The lithology is formed by basaltic rocks of the Serra Geral Formation, however, in higher elevations, it is common the occurrence of more acid rocks, such as the Riolith and the Dacito. Two samples were collected in Caçapava do Sul, in the region of Serra do Sudeste, further west of the State, where granites and metamorphized rocks, such as metatufos and metaandesitos, predominate (CPRM, 2006).

Conclusion

The different land uses analyzed showed differences in chemical attributes such as Mg, P, Zn levels. These differences translate present changes from land use to vineyard cultivation, and, in some cases, may result in degradation of soils and natural resources, requiring cultivation practices that minimize impacts. The range of characteristics of the soils analysed resulted in the absence of significant differences between land uses. The results obtained reinforce the importance of monitoring soil attributes in the analysis of the sustainability of production systems.

Results and discussion

The pH values were higher in the vineyard soils than in the forest. In this case, it can be observed the difference in management, with the adoption of liming and systematic fertilization, both chemical and organic. Besides liming, the addition of elements such as potassium and magnesium, by means of fertilization, also implies an increase in pH. This same practice is also reflected in the Mg contents, where the soils under vineyards present significantly higher values (table 1).

Table 1. Mg contents and average pH values in areas under vines and native forest in RS locations.

	Mg (cmolc kg ⁻¹)	pH
Native Forest	2,1 (1,11)* b	4,7 (0,45)* b
Vineyards	3,1 (1,47)* a	5,6 (0,48)* a

* The standard deviation in parentheses.

The distributions of the P, Cu, Zn and Mn contents showed values that did not meet the homogeneity of variances, so non-parametric analysis was performed (Mann Whitney) (table 2). In the case of P, the mean levels were about 21 ppm in vineyards, and 5 ppm in native forest. The management of vineyards is usually carried out with fertilizers as composting of animal waste, usually very rich in the element (ROLAS, 2016). Despite the significantly higher values in the vineyards, the phosphorus levels reached a maximum of about 60 ppm, not reaching critical values to mobilize this element in the soil, and consequently the contamination of water from nearby springs (Gebrem et al., 2010). The levels of micronutrients, specifically Zn and Cu, are quite high in the vineyard areas, with significant differences. Areas under fruit cultivation in general present relatively high levels of Cu, either by phytosanitary treatments, based on grouts, as by fertilization normally used with animal waste compounds (Leão et al., 2004; Lourenzi et al., 2016). In the work in question, Cu levels were especially high, and can even characterize a potential for soil contamination. In relation to Mn, higher values are perceived for areas of native forest. It should be considered that most of these areas are formed by soils originating from basaltic rocks, with high levels of the element. The intensive application of other elements may have reduced the presence of Mn, due to the imbalance in the soil exchange sites. Nascimento et al. (2014), working in areas of olericulture and fruit growing on the hillside, obtained similar

Table 2 Average levels of phosphorus and micronutrients in soils under vines and native forest in RS locations

	P	Cu	Mn	Zn
	mg kg ⁻¹			
Native Forest	5,49 (4,65) b	5,68 (11,13) b	85,81 (45,56) a	4,45 (2,76) b
Vineyards	21,90 (15,67) a	78,6 (100,9) a	30,04 (16,24) b	11,1 (7,12) a

* The standard deviation in parentheses.

The results showed that the use of the soil analysis is an important tool for monitoring the vineyard, mainly in relation to the climatic conditions of the region winery in study. The analysis showed that the soil has the capacity to retain nutrients, capillarity, thickness, heat emission, exposure to the sun, physical properties and, especially, control of water supply, a determinant factor for the good quality of vinifera. The study concluded that the biodynamic contribute to fertility and the reduction of soil acidity. In addition, identified that the production of inputs for the treatment of planting, the agricultural unit, allows a better interaction with the environment and the use of raw materials and waste.

References

- Brunetto, G. (2016). Atributos químicos de Latossolo após sucessivas aplicações de composto orgânico de dejetos líquidos de suínos. Pesquisa Agropecuária Brasileira, 51(3), 233-242.
- CPRM - Comissão de Pesquisa em Recursos Minerais. (2006) Mapa geológico do estado do Rio Grande do Sul. Escala 1:750.000. Projeto Geologia do Brasil ao Milionésimo.
- Gebrem, F. D. O., Novais, R. F., Silva, I. R. D., Schulthais, F., Vergütz, L., Procópio, L. C., ... & Jesus, G. L. D. (2010). Mobility of inorganic and organic phosphorus forms under different levels of phosphate and poultry litter fertilization in soils. Revista Brasileira de Ciência do Solo, 34(4), 1195-1205.
- LEAO, P. D. S. (2004). Cultivo da videira. Embrapa Semiárido-Sistema de Produção (INFOTECA-E).
- Lourenzi, C. R., Scherer, E. E., Ceretta, C. A., Tiecher, T. L., Cancian, A., Ferreira, P. A. A., & Nascimento, P. C. D., Bissani, C. A., Levien, R., Losekann, M. E., & Finato, T. (2014). Uso da terra e atributos de solos do estado do Rio Grande do Sul. Revista Brasileira de Engenharia Agrícola e Ambiental, Campina Grande. Vol. 18, n. 9 (set. 2014), p. 920-926.