

BIODYNAMIC PRACTICE IN *VITIS VINIFERA* VINEYARDS AND THE ENVIRONMENTAL SUSTAINABILITY OF THE SOIL

LA PRÁCTICA BIODINÁMICA EN *VITIS VINIFERA* VIÑEDOS Y LA SOSTENIBILIDAD AMBIENTAL DE LA TIERRA

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Abstract

Wine has shown a synergistic effect in a holistic context, and it has been referenced in recent years in several fields such as Medicine which considers it a natural antioxidant. Among other fields of study that find qualitative and quantitative characteristics in wine are Economics, Tourism, Design and Agribusiness. The wine industry, therefore, is constantly seeking new practices for *Vitis vinifera* grapes, such as the use of biodynamic agriculture, which shows positive results for the sustainability of the ecosystem and soil quality. The present study proposes to learn what interferes in the winegrower's decision when choosing environmentally sustainable practices in the management of the vineyard, and as an objective, to characterize the environmental profile of the biodynamic vineyard. The methodology used was a descriptive case study of qualitative analysis. Therefore, the factor that interferes the choice of the wine production system is the need to maintain the fertility and productivity of the vineyard and, in this case, the biodynamic system may be an option for a sustainable production of grapes.

Keywords: Viticulture; Production system; Environmental sustainability, Biodynamic practice.

Resumen

El vino ha mostrado un efecto sinérgico en un contexto holístico, y ha sido referido en los últimos años en varios campos como la Medicina que lo considera un antioxidante natural, Economía, Turismo, Diseño y Agronegocios, entre otras áreas de estudio que perciben cualitativa y cuantitativa características del vino. En este sentido, la industria vitivinícola está constantemente buscando nuevas prácticas para la uva *Vitis vinifera*, como el uso de la agricultura biodinámica, que muestra resultados positivos para la sostenibilidad del ecosistema y la calidad del suelo, garantizando así un mejor *terroir*. El presente estudio propone conocer qué es lo que interfiere en la decisión del viticultor al elegir prácticas ambientalmente sostenibles en el manejo del viñedo y como objetivo, caracterizar el perfil ambiental del viñedo biodinámico. La metodología utilizada fue un estudio de caso descriptivo de análisis cualitativo. Por lo tanto, el factor que interfiere en la elección del sistema de producción de vino es la necesidad de mantener la fertilidad y productividad del viñedo y, en este caso, el sistema biodinámico puede ser una opción para una producción sostenible de uvas.

Palabras clave: Viticultura; Sistema de producción; Sostenibilidad ambiental, Práctica biodinámica

Introduction

The wine sector shows a constant concern with production systems. In this sense, it perceives the pursuit of innovation in agricultural production practices of *Vitis vinifera*, which allows the use of soil in a more sustainable manner in environmental, economic and social issues.

The evolution of varietal production is permanently ongoing as indicated by the following authors: Gobbato & Martins (1938); Dias, (1959); Sousa, (1959). Grape production in Brazil is concentrated in the South region. Embrapa Uva e Vinho is one of the references in the development of technical-based studies for the production processes of grapes, with the purpose of contributing significantly to the improvement of quality (*vinifera* grapes), and the competitiveness of fine wines (Camargo, 2008).

Since viticulture is concerned with the production techniques and with the quality and productive capacity of the vineyard soils, the sectors related to viticulture currently play an important role in developing studies and techniques that contribute to the conservation and environmental sustainability of vineyards. In this sense, international institutions and bodies involved in the wine industry, such as the International Organization of Vine – IOV, have been promoting a debate in congresses and meetings on the development of new techniques, practices and tools that can provide the producer with the ability to evaluate systems and processes of sustainable wine production. This led to Resolution OIV-ECO 460-2012, which establishes criteria for vine-growing using the organic system, considering that it is a system that increasingly gains strength in the design of environmentally sustainable vineyards (OIV, 2016).

As a result, the search for more sustainable agriculture should combine economically viable, environmentally sound and socially acceptable practices with the aim of creating a system that is capable of preserving the very characteristics of the ecosystem. In this sense, sustainability is one of the factors that integrates a set of elements that are responsible for the formation of the wine terroir, since this results from the interaction between soil, topography, climate, biodiversity, customs and habits of a people, among other characteristics that are peculiar to each region (Lamastra et al., 2016).

In the case of Brazil, especially in the state of Rio Grande do Sul, grape producers are implementing programs such as good practices in agriculture and safe food, programs that are monitored by SEBRAE (Brazilian Service for Support to Micro and Small Companies) and entities such as IBRAVIN (Instituto Brasileiro do Vinho), FECOVINHO (Federation of Wine Cooperatives of Rio Grande do Sul) and others. Besides that, the number of hectares of vineyards produced in this system of organic practices has grown since 2005 according to data from the Technical Assistance and Rural Extension Company (EMATER, 2017), which accompanies the production of organic grapes. A lot of properties went moving forward in innovation of systems of production of vineyards, the shift to biodynamic viticulture seems an attractive alternative in terms of environmental sustainability and organoleptic characteristics of the wine (Villanueva-Rey et al., 2014).

However, the biodynamic system adopts a holistic approach, in relation to the exploitation of natural resources, considering the sustainability of different elements, such as: cultural issues, preservation of animal life, or soil maintenance, how to recover, how to preserve or improve ecological harmony to achieve a high quality of the system as a whole. But for this, the use of the practice requires that each farm be an integrated individuality; soil conservation practices; no use of chemical fertilizers and synthetic pesticides - only natural control products; nature conservation practices; social quality of work; application of homeopathic biodynamic preparations that increase the vitality of the environment, plants and the final product; no use of transgenic products (IBD, 2015).

Regarding environmental sustainability, in biodynamic vineyards there is less intensive use of machinery and, consequently fuels, instead employing artisanal operation strategies. However, White (1995), Hassall et al. (2005), Badgley et al. (2007), Seufert et al. (2012) point out that, despite the attractive gains in wine sales and the reduction of inputs, there is a significant reduction in the harvest volume of the vineyards, although, the wines obtained are of exceptional quality with regard to the higher concentration of polyphenols. However, the advantages of adopting the biodynamic practice lie in the equilibrium of the entire ecosystem of the vineyard and in its surroundings, allowing the development of biodiversity.

For Villanueva-Rey et al. (2014), the wines obtained using biodynamic practices have peculiar characteristics, which are the result of the vineyard management system such as low sulfite concentration and excellent organoleptic quality. Even with such benefits from the use of the practice, the same authors warn that the environmental benefits of applying these techniques with regard to climate change or levels of toxicity are still uncertain.

In this sense, we ask what interferes with the decision of the winegrower when choosing environmentally sustainable practices in the management of the vineyard? And our objective is to characterize the environmental profile of the biodynamic vineyard.

Material and Methods

The work here presented was a case study, descriptive of qualitative analysis. For Yin (2015), "the case study is an empirical investigation that investigates a contemporary phenomenon in depth and in its real-life context, especially when the boundaries between phenomenon and context are not clearly evident." The accomplished research was in a descriptive way, that allows to measure either to evaluate several aspects or components of the

researched phenomenon (Sampieri et al., 2006). In the interpretation of the data, qualitative analysis was used, which for Vieira & Zouain (2005), it is of fundamental importance to the testimonies, contents and meanings transmitted by the interviewees.

The data collection was carried out with the application of interviews with semi-structured questions, with the aid of audio recording. For Triviños (1987), the questions that constitute, in part, the interview, in the qualitative focus, do not arise a priori, but, it is one of the main means available for the researcher to perform the data collection. The interviews were carried out with the technicians from the vineyards here identified as Vineyard “D” and “U” respectively, using audio recording and notes. The vineyard “D” is in the conventional production system, migrating to the biodynamic system and vineyard “U” begins its production of grapes in the biodynamic system.

The content analysis technique, consists of a set of techniques of systematic and objective procedures, the description of the content of the messages, which allows the inference of knowledge regarding the production and / or reception (inferred variables) of messages (Bardin, 2004). But Richardson (1999) emphasizes that the analysis of interviews also means describing the text according to its form, that is, the symbols used, words, themes, expressions, phrases and their background, which tries to verify the tendencies of texts and the appropriateness of the content as was also accomplished here. Thus, the audits and annotations of those responsible for the management of the respective vineyards studied here are analyzed as a case of adaptation of the use of the biodynamic practice for the production of *Vitis vinifera* grapes, in the region of the Rio Grande do Sul, Brazil.

Results and Discussion

Studies regarding the use of biodynamic practices in agriculture in the state of Rio Grande do Sul are being gradually developed and are still considered experimental. According to winemaker "U" " interest is still mainly focused on the money that can be earned from wine produced using biodynamic practices, and not on the benefits that may lead to better land use and quality of environmental biodiversity. There is a lack of conviction of some producers regarding the use of biodynamic practices". He realizes, then, that biodynamics can be a re-learning of soil management, that it is necessary for the producer to understand the relationships within the production unit.

The biodynamic system requires attention, discipline and sensitivity of the producer in its decisions in of management of the soil. Therefore, biodynamic agriculture requires the deconstruction and detachment of conventional concepts and techniques, to innovate in rural properties the results must provide environmental, economic and social sustainability.

Considering the observations and analysis of the contents, it is evident that the choice of the winegrower for the use of biodynamic practice is balance the biodiversity and improve the quality of the soil, considering the principles in one living soil balanced ecosystem and respect for the cycles and rhythms of nature. Because, according to the IBD-DEMETER standards, the practice allows significantly reducing the use of fungicides and doing away with herbicides altogether. As says the winemaker of the "D" Vineyard "to adopt biodynamics is in the search for results in the production of grapes with more intense flavor, with greater concentration of aromas and color, and thus, having a balance of the production system and the results guaranteeing a better *terroir* ".

Already, the winemaker of the Vineyard "U" "makes use of the biodynamic practice to preserve the vineyard, soil biodiversity and human health. "In this same perception the winemaker of the "D" vineyard agrees that yes "... the biodynamic practice is a sustainable form for the management of vineyards".

However, the interviewees are unanimous in stating that the use of biodynamic practice in viticulture in the Serra Gaúcha "... has a long way to go". For the respondent of the "D" vineyard "... biodynamic practice is a start to minimize the use of synthetic additives in the production of *Vitis vinifera*, but it is necessary to be aware of the climatic variations of Rio Grande do Sul, which is humid and Subtropical. Under these conditions the biodynamic practice in viticulture requires care, because it is in an environment of constant climatic imbalance. But it is possible to make adjustments between the conventional and the biodynamic process of vine production, using less pesticides and a vineyard under environmentally sustainable management."

It is noted that the production of vines requires care and behavior changes in the management of production techniques. The “D” vineyard interviewee reports that: "... the use of insecticide and herbicides in winemaking is present on the surface of the grape, which is in contact with the must, in a two-phase system composed of a

liquid phase, and a solid phase. Cabras & Angiorni (2000), point out that such residues can still be found in the ready-to-drink beverage, even with the reduction of the concentration of most agrochemicals during fermentation processes.

However, using no agrochemicals in vine production requires taking great care of the vineyard in order to balance it against climatic variations and improve the quality of the vines, and not compromise the harvest by the attack of fungi and diseases in their maturation phase. According to Turinek et al. (2009), the biodynamic preparations which are important to the equilibrium of the soil and the of the ecosystem, but, the production of prepared involves unconventional rituals in their preparation, and sometimes it can be difficult to understand the mechanics of natural science, which is still under investigation, for now, biodynamic compounds are explained as nitrogen fertilization.

In this way, it is understood that have much to learn about biodynamic practice, and to be willing to innovate and construct new concepts of soil management techniques, which improves good quality of the environment. Only thus the sustainability of vineyard will be guaranteed for the use of future generation.

Conclusion

Therefore, the environmental profile of the biodynamic vineyard is characterized by the balance of biodiversity, the non-use of insecticides and herbicides, but also by the use of compounds, biodynamic preparations, a calendar based on the phases of the moon and also the philosophy of a production system in balance with nature.

Therefore, the use of biodynamic practice in vineyards will depend on the intentions of the winegrower, what he really wants, and his commitment to life and not just the result focused on capital. A smaller volume will be produced, but the winegrower will realize that, the soil of the vineyard is a living organism, which needs to be cared for and taken into account.

Finally, the wine producer must consider in their choice the needs of soil, the use of low environmental impact techniques on the ground, to maintaining and restoring biodiversity balance of the vineyard.

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