PRODUCTION AND DESIGN SYSTEM IN THE TERRITORY OF VITICULTURE

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ABSTRACT

The cultivation of vineyards is connected with the history of humanity and with the transformations of spaces and places that in a dynamic and harmonious way provide enchantment and the production of a secular product.

With the evolution of the market and changes in natural resources, a holistic and multidisciplinary approach to the cultivation of vineyards became necessary, be it in the revision, management systems and also, particularities of each soil, relief, climate, landscape to design a system for growing vines. The aim of the study: to characterize the design of the biodynamic vineyard. To this end, a descriptive case study with qualitative analysis was carried out, interviews were conducted with two owners who use the cultivation system, biodynamic agriculture. It is concluded that the need to plan the vineyard requires holistic knowledge of the entire wine production system

Key words: *Vitis vinifera*; Vineyard; sustainability; environment; design.

1. Introduction

The wineries production systems date back to ancient times. Because, in many countries, wine is considered as a complement to the daily diet, and, increasingly, there is a concern with production systems from the vineyard to the consumer's table. The winemaking process is a complex phenomenon that begins with the choice of the vine, the planting system and the management of the vine, reaching the presentation of the product for your enjoyment and consumption. The environmental and socioeconomic effects of the entire production process are also considered. However, given the complex stages of production, wine is still considered medium to low in terms of its environmental impacts; however, it requires a considerable amount of resources in its production process, such as: water, energy, chemical substances and, in addition, it produces a large amount of effluents and organic residues.

As can be seen, wine has the ability to bring benefits to human health, for example we have the recognition of medicine that considers it a natural antioxidant. According to Hashizume [1], wine is a product of the transformation of living plant matter by live microorganisms, thus its composition is directly linked to biochemical phenomena. According to Mezzano et al [2], the most complex composition of existing components in wine comes from the grape and the fermentation process, but the phenolic compounds are in the grape skin, which according to Pimentel et. al [3] what differentiates the wine from other beverages of fermentation process and with alcoholic content.

Therefore, wine has the ability to cause synergistic effects on the economy, tourism, design and agribusiness, among many other áreas. It is also possible to see that wine releases qualitative characteristics through the subjective sensations it produces during its consumption and appreciation, as well as quantitative effects such as the added value that the product provides in its production chain and other segments of the economy.

As a result, the trends of greater appeal to wine consumption, sectors, institutions and international bodies, such as the International Organization of Vine (OIV) have promoted in their meetings and meetings the debate on the development of new techniques, practices and tools that can provide the producer with

conditions to evaluate systems and production processes from vine to wine, such as the use of good practice programs, safe food, programs provided by SEBRAE and entities such as IBRAVIN, FECOVINHO and others, as stated in the OIV resolution -ECO 460-2012, which establishes criteria for organic viticulture [4], considering that it is a system that is increasingly gaining strength in the wine sector, seeking environmentally sustainable vineyards.

The present study has the following questions: a) How do winegrowers perceive biodynamic agriculture for the production of wines? And the objective: to characterize the landscape profile of vineyards that use biodynamic management. This study deals with the study of two vineyards in Serra Gaúcha that started to introduce biodynamic treatments in wine production.

2 State of the art in Vitis vinifera vine cultivation

According to the problem question, the article will continue with the bibliographical review on the cultivation of Vitis vinifera vines, the biodynamic practice and, finally, the biodynamic vineyard design.

2.1 Vitis vinifera grapes

The grapes of the Vitis vinifera species can be consumed in natura, such as raisin, or used in the production of wines and/or spirits, juices or sweets of various types. In addition, they provide other by-products such as natural dyes, tartaric acid, seed oil and tannins. However, compared to other fruits, it has the following positive aspects: it does not need to be peeled, which prevents the juice from running off; it is easily handled, as it is attached to the bunch; it has a crunchy texture and good balance between sweet and sour flavors; withstands storage and transport relatively well. Its flavor is quite diverse and varies according to the variety, being, in general, highly appreciated by consumers [5].

But the purpose of the production of Vitis vinifera grapes and the production of wines, for and obtaining a quality product depends on a large number of factors, both natural and human. The optimization of these factors can result in a significant increase in the quality of the wine, adding value to it and enabling the wine-growing activity in a given region. Monitoring the maturation and harvesting at the right time are essential steps to obtain maximum wine quality. Grape ripening conditions vary from season to season, which is why monitoring must be repeated year after year [5]. Additionally, some basic care during harvesting contributes greatly to obtaining a significantly unique level of quality in the wine.

However, it is clear that the cultivation of wines in the soil of sub-tropical climate, which is the case in southern Brazil, is characterized by constant climatic uncertainties and demographic diversities, which contribute to the design of the profile of the vineyards in these territories and compose its southern landscapes. According to EMBRAPA [6], some criteria in the ecodesign of vineyards are considered as: a) the geographic characteristics of the region; b) the rainfall index; c) the type of vines; and c) the natural conditions prevailing in a given crop.

In the case of southern Brazil, and particularly in Serra Gaúcha, the most used criterion to evaluate a production is the glucometric degree (sugar content). This concern is due to the fact that wine is the product that results from the process of transforming the sugar contained in the grape into alcohol and other

secondary products, in this case, the aromatic compounds and phenolic compounds contained in the grape are related to the increase of the sugar content [6].

Therefore, making use of design to plan, design the vineyard can lead to adequate use and consists of natural resources (soil, water, energy), human and economic in balance with the local ecosystem. This is reflected in the local landscape and in the wine's identity. Biodynamic agriculture has shown opportunities for the cultivation of wines in harmony with the agricultural system and its surroundings. The design of the vineyard will reflect how much we are responsible for the heritage and landscape around it.

2.2 Biodynamic cultivation system

Biodynamic viticulture is an agroecological practice that balances the ecosystem where the vine will be developed, taking into account the concepts and principles of a living soil, biodiversity on the property, and respect for natural cycles and rhythms. In addition, Mclaughlin [7] understands that biodynamic viticulture encompasses all organic production guidelines, but with some particularities of this practice, such as the use of a biodynamic calendar that indicates the days and times of planting and harvesting depending on the moon, sun and stars.

According to IBD [8] (2016),

> Biodynamic Agriculture seeks to develop a healthy landscape, with permanent productivity, in which the quality of food is improved through the care of the soil. It also favors a comprehensive view of the agricultural system, harmoniously inserted into the local landscape, considering its ecological, social, cultural, economic and phenomenological principles.

The biodynamic cultivation method according to Turinek et al [9] is an effort to diversify, and seek the constant evolution of the field, which can lead to long-term environmental, ecological and economic sustainability. Biodynamic farming encompasses composting practices, farming systems using fertilizers, crop rotation, care for animal welfare, organism/entity and local distribution systems, all of which contribute to protecting biodiversity and improving livelihoods of farmers.

According to Turinek et al [9] DEMETER (the body responsible for biodynamic certification) requires that the use of biodynamic practices have the maintenance of animals for the use of manure, for this, it encourages the creation of local breeds and varieties, in addition to a strict standard for processing prepared, as well as the use of holistic rituals in crop management.

According to O IBD [8], the Biodynamic Institute that certifies Brazilian organic products, the Biodynamic practice began in 1924 with Rudolf Steiner in Europe, but currently corresponds to a movement that involves more than 4,900 producers worldwide. However, to receive the DEMETER seal, it must meet criteria, in the case of a vineyard, it is considered an individual property but integrated with the ecosystem, it must adopt soil conservation practices, not use chemical fertilizers and synthetic pesticides, only control products natural, must adopt nature conservation practices, value the social quality of the work, make the use and application of homeopathic biodynamic preparations that increase the vitality of the environment, plants and the final product, does not allow the use of transgenic products.

Thus, biodynamic wines have stood out for their aromas and textures. Due to the absence of pesticides, it allows the appearance of natural fungi during cultivation and subsequent fermentation, which

provide unique regional quality and aroma, enhancing the “terroir”. Furthermore, biodynamic preparations add vitality and authenticity to the wine [8]. Therefore, biodynamic agriculture is based on the interrelationship between all the kingdoms of nature: soil, plants, animals, including human and astrological influences, establishing a product life cycle in view of the biodiversity established in the systemic relations of the territory.

On the issue of environmental sustainability, it is noted that in the biodynamic vineyard it is possible to use less intense machinery and, consequently, fuel, implementing artisanal operation strategies. However, White [10]; Hassall et al [11]; Badgley et al [12]; Seufert et al [13] observe that, despite the attractive gains in wine sales, in the reduction of inputs, there is a significant reduction in the volume of the vineyard's harvest.

However, the wines obtained using these methods show an exceptional quality with regard to the highest doses of polyphenols. Therefore, the advantages of adopting the biodynamic practice are in the balance of the entire ecosystem of the vineyard and its surroundings, and thus allows the development of biodiversity.

However, some characteristics are peculiar to the result of the vineyard management system, such as: low concentration of sulfites and excellent organoleptic quality [14]. Even in the face of such benefits from the use of the practice, Villanueva-Rey et al [14] warns that the environmental benefits of applying these techniques, namely, with regard to climate change or levels of toxicity, are still uncertain.

Biodynamic agriculture significantly reduces the use of fungicides and eliminates the use of herbicides. This is what is observed in scientific studies and reports from producers who started to adopt this type of agriculture. Thus, the winegrower obtains a result of the production of grapes with a more intense flavor, greater concentration of aromas, color, with balanced production and, above all, that faithfully reflects the potential of the terroir.

For Maby [15], wine needs identity, but it does not mean that the territory needs identity, but extended to all facets of territorial complexity, at least to all those that mean a "being" of the territory, wine contributes to construction of global territorial representation, gives and assumes, because this representation is enriched by all the other components and solidifies them. Finally, the wine, due to its history, its agronomic technicality, its richness, its flavors, aromas, develops the ability to surpass all other cultures in a territory, even in many territories, not being the most economically profitable, but the most remembered.

Maby [15] concludes that the vineyard is the privileged space of identity, it is because wine is first, the privileged space of discourse and if both are so strongly attached to the territory, it is because the discursive function is the first instance of territoriality. As well as, the fact that the vine is part of the construction of landscapes, inserting itself in the culture and taking root in the customs of a place, this becomes susceptible, according to Maby [15], to connect with the identity of the territory that exists only as a social projection in space.

2.3 Biodynamic vineyard design defining a viticultural territory identity

Landscape design on farms begins with the acceptance of natural conditions [9]. In this case, rural properties begin to play a fundamental role in the relationship between man and nature, being one of the

focuses of imminent changes in the cultivation and production system of food and the use of the natural landscape.

According to Santos [16], landscape is understood as a set of forms that, at a given moment, express the inheritance of the successive relationships between man and nature. For Maby [15], the territory is the material basis for the landscape.

The landscape does have the capacity to legitimize wine-growing territories, since all its cultivation in each space becomes a participant in the population that lives there, as well as those who visit it, as records of each harvest, each year, history, a relationship with the daily lives of these people, the vine, the grape, the wine is in the family album, travels, records of the bad year, the good year.

Grape and wine are intertwined with the history of humanity and territories and they are often called the wine territory.

The concern with preserving the natural characteristics of the territories is due to the valuation of the natural landscape both for the economy of tourism, as well as the well-being of the ecosystem, it will certainly contribute to the formation of the "Terroir", as this results from the interaction between the soil of a given region, its topography, climate, biodiversity, customs, habits of a people, among other characteristics that are present in each peculiarity of each region [17].

Therefore, viticulture is present in the economy, in the social agreement and in the balance of the ecosystem for the continuity of history. Corrêa and Rozendhal [18] translate the landscape as a “field of visibility”, when our perception and our subjectivity and experience are offered, it becomes an individual and/or collective “field of meaning”.

According to the resolutions of the OIV [4], international wine institutions and bodies have been gradually advancing in the discussion in the search for environmentally cleaner and socially fair vineyard cultivation techniques. It can be seen, even though it is incipient, that innovation in the cultivation of vines has been one of the concerns of winegrowers. How to think about the construction of the vineyard, the management systems, the conscious use of the soil.

For this, Benyus[19], in her work entitled Biomimetics: innovation when inspired by nature, brings several lessons on how to look for more intelligent systems in the natural world to solve human problems. For, the author [19], a large part of the losses that occur in agriculture are a consequence of the obsession with production, the eagerness to transform an organic enterprise into a factory, in an attempt to convert agriculture into a machine.

Benyus [19] also makes an allusion to the tireless work of The Land Institute, whose director “Wes Jackson” used to say that his research seeks a new type of agriculture that is: “more resistant than human folly”. In this sense, Benyus [19] refers to researchers and farmers who believe that nothing is more sacred than the pact between human beings and the land that gives them food.

Amidst this context, cleaner and more sustainable management systems are sought in their production practices. One of the models that shows itself as a reinterpretation of the agricultural system used by man before the green revolution, without the use of pesticides and often. based on the wisdom of the forces of nature, it is presented in the practice of biodynamics, which brings possibilities for soil revitalization, combined with increased productivity, with the suggestion of expanding the use of the property with the integration of other activities, such as the creation of animals.

It is an excellent perspective of sustainability and at the same time qualification of production [20]. With this, designing or redesigning the vineyard can contribute to a better productive performance and use of the soil in the cultivation of vines. Given this, the search for a more sustainable agriculture must be understood as a combination of economically viable, environmentally healthy and socially acceptable practices with the objective of creating a system that is capable of preserving the ecosystem's own characteristics.

3 Methodology

The research was carried out in the form of a case study, descriptive of qualitative analysis. For Goode and Hatt [21], the case study is a way to organize the social data, so that the unitary character of the social object under study is maintained, which can be a person, a family or a social group, a set of relationships or processes in a territory. The descriptive study measures or evaluates various aspects or components of the phenomenon studied [22].

Data collection was done using a questionnaire with semi-structured questions, which were tabulated and treated using descriptive procedures. Then, the interviews were treated and interpreted with the aim of identifying complementary considerations about the investigated factors, using the content analysis technique, according to Bardin [23], it consists of a set of communication analysis techniques, aiming, by systematic procedures and objectives for the description of the content of the messages, which allow the inference of knowledge related to the conditions of production and/or reception (inferred variables) of the messages.

The procedure adopted was an individual interview with the technical responsible for the vineyard. The interview script was structured in two parts: a) perceptions about the production systems of Vitis viníferas with Biodynamic practice; b) the impact of the paradigm shift in the vineyard production system.

4. Results and Discussions

Wine production consists of four main stages: 1) viticulture (related to the planting of vines and growing grapes); 2) production and bottling of wine (from winemaking to storage); 3) transport of wine, distribution and sales and 4) disposal of empty bottles. The present study focuses on the first stage of the process, since the Biodynamic practice takes place in the planting of vines and the cultivation of grapes. The research sample was in vineyards of biodynamic practice located in Serra Gaúcha, Rio Grande do Sul - Brazil, Northeast Mesoregion of Rio Grande do Sul, a region with humid and rainy climate, factors that are already present in the characteristics of the wine.

The vineyards studied here are identified as “D” and “U” vineyards respectively. Interviews were carried out with a questionnaire and were recorded using a cell phone recorder. The place of application of the interview was on the property of the vineyards in question, and soon after the interview, he carried out a field visit to the vineyard, as shown in the photos in the register below (Fig. 1).

Figure 1- Biodynamic Vineyard

Source: Research, 2017

For the interviewees, biodynamics is an agroecological practice that allows the balance of the vineyard ecosystem, which will be developed in the production of the vineyard, taking into account the concepts and principles of a living soil, biodiversity on the property, and respect for natural cycles and rhythms.

However, this system significantly reduces the use of fungicides and eliminates the use of herbicides, the intention of applying the biodynamics according to winemaker "D", is the result of grapes with more intense flavor, greater concentration of aromas, color, with balanced production and , above all, to be able to reflect a better terroir.

Since, the use of biodynamic practices is in the balance of the entire ecosystem of the vineyard and its surroundings, allowing the development of biodiversity and how, there is no use of any herbicide, fungicide and chemical pesticide, improves the quality of the soil and water sources.

In the reports of the winemaker from Vinhedo "U" "the biodynamic practice is used with the interest in preserving the vineyard, the soil, biodiversity and human health". *For the winemaker from vineyard "D" "the biodynamic practice is a sustainable way for the production of vines".* On the other hand, it was observed in the reports of winemakers that the difficulty in using biodynamic practice is still in achieving or producing biodynamic preparations for the treatment of soil and fruit, this also reflects the condition of breaking conventional paradigms to live the biodynamic process. Because, this reflects both on human behavior and on the conditions of the soil that needs to be recovered and reinvigorated in the right conditions for a balanced biodiversity.

But, for the researched winemakers trained in biodynamic practice, "the road is long". For the responsible for vineyard "D" *"the biodynamic practice is a start to minimize the use of synthetic additives in the production of Vitis vinifera. But, in the climatic conditions of the Serra Gaucha, which is in a humid and sub-tropical climate, biodynamics requires care, as it is in an unbalanced environment, he believes in the possibility of developing adjustments in viticulture, with less pesticides and harmony with ecosystem."*

For the responsible for the vineyard "U" *"The biodynamic practice is a lifestyle, not just a practice to meet process requirements, it is necessary to believe, and observe the ecosystem. It is necessary to seek to meet the needs to keep biodiversity in balance in the vineyard".*

In view of the reports and studies shown here in the discussion of the search for practices that make it possible to produce Vitis vinifera grapes in a more sustainable way and with added value that allows better quality for the producer and the consumer, it is necessary to deconstruct and detach from concepts and techniques and seek to innovate in rural property. But for this, the results need to go beyond the business profit, it needs to be sustainable in social, environmental and economic issues.

However, there are studies in Serra Gaúcha on the development of several properties that are venturing into the use of biodynamic practice, but according to winemaker "U" *"interests are only focused on the possibility that the value of biodynamic wine can grant market and not for the benefits it can provide for better land use and the quality of biodiversity in the environment. The lack of conviction in practice is perceived"*

Therefore, the results may be in line with the attitudes of the trainers and multipliers responsible for introducing biodynamic agriculture. Because, the biodynamic practice requires a paradigm shift in the form of farm management and in soil treatment and product processing.

4 Final Considerations

Finally, consider the initial question to know how winegrowers perceive biodynamic agriculture for the production of wines? What is evident in the interviewees' speech, which means reducing and not using chemical treatments and also seeking to understand the astrological influences on grape production, leading to a balance in the ecosystem, but how is this possible?

The answer he got was that, to think about the design of the vineyard, considering the purposes of the winegrower, what he really wants, the commitment to life and not just the short-term financial result, but the long-term return will be of vineyards with their own and unique qualities, without the use of manipulation of synthetic inputs and, in addition, the landscape shows its potential and the identity of a territory.

Therefore, the introduction and adaptation of cropping systems with less environmental impact, for the cultivation of vineyards, is on the rise. For this, access to information, knowledge and understanding of how to adapt and make use of more sustainable systems is necessary. This requires technical monitoring, management and maintaining the balance of the ecosystem.

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