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Brazilian Natural Wines - An Overview

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ABSTRACT

The natural wines sector has drawn attention within the wine sector as a result of a growing consumer demand for more natural products and without the use of pesticides. In European countries there are already a significant portion of the wine sector. In Brazil, although still timid, the demand and production of these products has been increasing, year after year. This article aims to elucidate the difference between the concepts of natural, biodynamic and organic wines, as well as to bring, also within the global context, the panorama of Brazilian production of these wines.

KEYWORDS: Biodynamic. Natural Wine. Organic wine.

INTRODUCTION

The trend in global climate change, in addition to the exhaustion of natural resources, have contributed to increase the need for a change in agriculture, among other economic businesses. Therefore, the need to revert negative impacts of environmental issues, such as global warming and negative environmental trends have become urgent. Consumption profile has, therefore, suffered an adaptation, particularly among those who have concerns regarding sustainable consumption (SCHIMMENTI *et al*., 2016). Besides, the search for healthy food and beverages has enhanced the habits for consumers to be more selective regarding the quality of what they ingest (ASIOLI *et al*., 2017).

In 2020, according to the Organic Agriculture Research Institute (FIBL) and IFOAM Organics Europe and International almost 506’400 hectares or 7.3% of the global grape area was under organic management. Brazil has 1'319'454 ha of organic area once considering all agricultural production, which represents 0.6% of organic share and according to it, none of it is accounted for grapes worldwide. Data are sourced by FiBL survey 2022, based on information from the private sector, certifiers, and governments (WILLER *et al*., 2021).

Therefore, as the demand for this kind of products grows, the definition of “natural” has gone into a gray zone, since it is added in several labels of products which are not as natural as consumers expected. It happens because there is a vague concept regarding what is natural and what is not (ROMAN *et al*., 2017; ROZIN, 2006).

Only by the fact of having the term “natural” in a label makes the product more attractive to consumers, as it is usually linked to a healthier product, moreover they tend to be eco-friendly. (ROZIN *et al*., 2012; CARACCIOLO *et al*., 2019).

Theoretically, wine is a natural beverage since it is made from grapes and fermented by microorganisms. However, with the process of industrialization and the large scale of production, wine became a beverage full of additives. As examples of these additives, we can cite sulfur dioxide, copper sulfate, albumen (egg white), milk products (pasteurized whole, skim, or half-and-half). As clarifying agents, it is common to use gelatin. But there are other substances, such as

protease (trypsin, pepsin), isinglass, plant proteins, casein (potassium salt of casein), silicon dioxide, tannins, yeast protein extract, bentonite, beta-glucanases enzymes, chitosan. De-acidifiers such as calcium carbonate (aka chalk) and acidifiers such as tartaric acid, malic acid and citric acid. Stabilizers, which, besides the sulfur, there are a few other common wine stabilizers. Acetaldehyde for color stabilization and dimethyl dicarbonate (DMDC) which is used to sterilize and to stabilize wine as well as dealcoholize it. For stability: yeast mannoproteins, potassium hydrogen tartrate, carboxymethylcellulose. For the fermentation: yeasts and the fermentation nutrients (GALPIN, 2006). Therefore, once one considers the number of substances which are commonly added into a wine bottle, it can conclude it is no longer a natural beverage.

Hence this work, within the context of natural wine (which is a classification per se) as a concept inside this classification, will approach the differences of natural wines, which can be classified as (a) organic (b) biodynamic (c) natural.

Therefore, the aim of this work is to explain the concept and differences among natural, organic and biodynamic wine, as to bring the current situation in Brazil regarding the producers of these products.

MATERIAL AND METHODS

Bibliographic research regarding the topics were made to classify in the best and accurate way possible the wines according to their classification. Research in governmental and certified organs were made to list the wineries according to their classification nowadays.

RESULTS AND DISCUSSION

The premise which advocates natural wines, being either organic, biodynamic managed or natural is simple: if the first wines were obtained spontaneously, why not do it this way again?

Organic, biodynamic, and natural wines are quite similar if one reflects the fact that all of them consider no or minimal intervention from human beings during the entire production chain. However, there are differences between them. The term “natural” is either how biodynamic, organic and natural (within the

classification) are classified, but also one of the classifications. It is relevant to discriminate that a wine can be both (produced by agricultural interventions within a classification, as it can be also produced by the same method. Wine can be, for example, organically produced in the concept of organic agriculture, and be produced by natural classification. Therefore, it will have arisen from organic agriculture but will have no additives added into it, in comparison to the organic wine classification allowance. Although the term “natural” is used in a way that characterizes all three categories, it is a category by itself, and it can vary from one place to another.

Organic wine and biodynamic wine are meant to have their production with healthy and harmless grapes, although the first does not necessarily need to be fermented spontaneously or suffer minimum addition of additives. The term “natural wine” requires, though, the need of grapes not to have been treated with agrochemicals, as the production needs to have passed through none or minimal intervention. Therefore, naturalness needs to happen in both viticulture and vinification (WEI *et al.*, 2022).

Hence, the definition of natural wine considers it to be a beverage produced by grapes which have no agrochemicals added and some producers make the wine within the biodynamic method. By default, the fermentation is natural, i.e., no yeasts are added. The winemaking process occurs without the addition of any other chemical to stabilize the wine, or to correct any characteristic, as it is not filtered.

Wei *et al*. (2022) have presented a study in which the natural wine definition is cleared and classified. According to the authors, within this topic, wines can be organic wines, biodynamic wines, natural wines, and clean wine. The difference can be found in the viticulture (use of synthetic fertilizers, herbicide, pesticide, Bordeaux mixture) and in the winemaking process (yeasts, additives, traumatic physical techniques, sulfites, and histamine addition. We are going to focus on the first three categories, as the term “clean” is not really used in Brazil.

Although wine additives make the outcome for the winemaking safer, it ends up promoting a “standardization” of wine at the cost of individuality (LUKACS, 2019) according to producers of natural wines.

Natural winemakers preach that the only way of producing a wine from a specific terroir, is by making it in a natural way (with no addition of additives). Thus, there will be the expression of natural yeast developed in that specific region, which may be different from any others. As the soil microorganisms and nutrients, which would also be unique, without the addition of pesticides.

There are some similarities and differences among the wines mentioned above, there's a definition in Table 1. Brazilian classification follows European Union standards.

Table 1 - Similarities and differences among Natural, Organic and Biodynamic wines classified by EU.

Parameter / Method	Natural	Organic	BDN
Bordeaux Mixture	N	Y	Y
Lime sulfur mixture	N	Y	Y
Harvest	Hand picked	Hand picked	Hand picked
Yeast	Addition not allowed	Certified organic	Native yeast
Additives	N	Certified organic	BDN / Organic certification
Traumatic Physical Techniques	N	Prohibition of the desulfurization	Y
Sulfites	30 mg L^{-1} for red 40 mg L^{-1} for white	100 mg L^{-1} for red 150 mg L^{-1} for white	70 mg L^{-1} for red 90 mg L^{-1} for white
Certification in Brazil	N	Y	Y

Abbrev.: BDN (Biodynamic); Y (yes); N (no); EU (European Union)

Source: CRAVERO, 2019; CASTELLINI; MAURACHER; TROIANO, 2017; FABBRIZZI *et al*., 2021; SMITH, 2021

It is important to clarify that none of these methods allow the use synthetic fertilizers, herbicides, or pesticides. Bordeaux mixture is a fungicide allowed in Organic Agriculture in Brazil because copper sulfate is a low-toxic product, as it improves the nutritional balance of plants. Bordeaux mixture is a fungicide that emerged in the last century, in the region of Bourdeaux, France, to control downy mildew in vines. Within additives allowed in each of the three types of wines mentioned above, one can check in Table 2 which are accepted in organic, biodynamic, and natural wines by European standards. Brazil follows up these parameters.

Table 2. Substances that can be added into Natural, Organic and Biodynamic wines within each classification, generally

Organic (BIO) before 2012	Organic (BIO) after 2012	Biodynamic Wine (Demeter)	Natural
Citric acid / L(+) tartaric acid / L-ascorbic acid / L-malic acid D,L malic / Lactic acid / Metatartaric acid / Acidification by electromembrane treatment / Egg albumin / Ovalbumin / Sulfur dioxide (SO_2) / Auto enrichment by evaporation / Auto enrichment by reverse osmosis / Lactic acid bacteria / Bentonite / Potassium bicarbonate / Potassium bisulphite / Ammonium bisulphite / Calcium carbonate / Carboxymethylcellulose (CMC) / Cellulose gum (CMC) / Potassium caseinate / Casein / Oenological charcoal / Chitinglucan / Chitosan / Copper citrate / Fish glue / Thiamine dihydrochloride / Silicon dioxide (silica gel) / Yeast husks / Electrodialysis / Beta-glucanase enzymes / Spontaneous alcoholic fermentation / Flash pasteurisation / Gelatin / Gum arabic / Di-ammonium hydrogen phosphate (diammonium phosphate) / Potassium hydrogen tartrate (Cream of tartar) / Active dry yeasts (LSA) / Lysoz yme / Yeast mannoproteins / Protein materials of plant origin from wheat or pea / Potassium metabisulphite / Cross-flow microfiltration/ Pieces of oak wood / Concentrated must / Rectified concentrated must / Polyvinylpolypyrrolidone (PVPP) / Enzymatic preparations (pectinases) / Cation exchange resin / Sucrose (Sugar) / Copper sulphate / Ammonium sulphate / Oenological tannins / Neutral potassium tartrate	Citric acid / L(+) tartaric acid / L-ascorbic acid / Lactic acid / Metatartaric acid / Egg albumin (Ovalbumin) / Self-enrichment by evaporation / Self-enrichment by reverse osmosis / Lactic acid bacteria / Bentonite / Potassium bisulphite / Potassium metabisulphite / Potassium bicarbonate / Calcium carbonate / Potassium caseinate / Casein / Oenological carbon / Copper citrate / Fish glue / Thiamine dihydrochloride / Silicon dioxide (silica gel) / Yeast shells / Spontaneous alcoholic fermentation / Gelatin / Arabic gum / Di-ammonium hydrogen phosphate (diammonium phosphate) / Potassium hydrogen tartrate (Cream of tartar) / Active dry yeasts (LSA) / Protein materials of plant origin from wheat or peas / Tangential microfiltration/ Pieces of oak wood / Concentrated must / Rectified concentrated must / Enzymatic preparations (pectinases) / Sucrose (Sugar) / Copper sulphate / Oenological tannins ics / Neutral potassium tartrate / Sulfur dioxide (SO_2)	Egg albumin / Sulfur dioxide (SO2) / Bentonite / Oenological carbon / Cross-flow microfiltration / Sucrose (Sugar)	In some places, SO_2 in minimal quantity is allowed

Source: MENDOZA, 2013.

ORGANIC WINES

In the second half of the 19th century, an Italian professor of Agronomy, Pietro Cuppari, was the pioneer in theorizing concepts that later formed the basis of modern organic agriculture. Through his studies in 1862, he evaluated the property as a living organism, how the interaction with its components balanced organized according to physical, biological, technological, and economic bounds (CAPORALI, 2015 apud PIVA; Rafael, 2018).

Organic agriculture in Brazil follows Law n. 10831/2003 (BRASIL, 2003); Decree no. 6323/2007 (BRASIL, 2007) and the normative instruction IN 46/2011 (BRASIL, 2011). A large part of the organic area is formed by pastures. The main products in the areas cultivated are rice, green fodder, oilseeds, vegetables and dried legumes. Among the permanent crops, coffee, olive trees, grapes, nuts and cocoa stand out (WILLER and LERNOUD, 2011). In 2012, there were almost 6 thousand registered producers in the country and in March 2019, it has already registered more than 17.700, a growth of 200%. In the period, the number of organic production units in Brazil also grew, from 5,400 registered units in 2010 to more than 22,000 in 2018, a variation of more than 300% (BRASIL, 2019).

Organic wine agrees with organic farming. It means that, as it can be seen in Table 1, no artificial or chemical fertilizers can be used; natural compounds are allowed, if organic. No pesticides, fungicides or herbicides are allowed. Organic wine is regulated differently in different countries, usually by different institutions and as a result, there's no single regulation statute.

The Brazilian Wineries certified as organic by the Law n. 10.831 are presented in Table 3.

Therefore, for a product to be labeled and sold in Brazil as “organic”, it is mandatory that the production unit undergoes one of the three organic quality assurance mechanisms – certification by audit, participatory certification or being linked to a social control organization. This obligation is based on risks to consumer safety or the environment (BRASIL, 2022).

Therefore, certification can be obtained by hiring an Audit Certifier or by joining a Participatory Assurance System – SPG, which must be certified by a Participatory Organization for Organic Quality Assessment – OPAC. In the case of

OPAC certification (ECOVIDA, **Table 3**), the producer must actively participate in the group or nucleus to which one is linked. Everyone takes care of everyone and responds together if there is fraud or any irregularity that is not pointed out and properly corrected.

Table 3 - Brazilian Organic Wineries

Winery	Location	Certification Unit
Adega Bianchetti Tedesco Ltda	Lagoa Grande, PE	IBD
Agroindustria e Vinicola Valiati Ltda	Rio do Sul, SC	IBD
Vinícola Vivente	Colinas, RS	IBD
Ben Vic Sucos e Vinhos	Gramado, RS	ECOVIDA
Casa Postal Bebidas Ltda	Bento Gonçalves, RS	IBD
COOPEG- Cooperativa de Produtores Ecológicos de Garibaldi LTDA	Garibaldi, RS	ECOVIDA
Cooperativa Agroindustrial Nova Aliança Ltda	Flores da Cunha, RS	ECOCERT
Cooperativa Agropecuária de Produção e Comercialização Vida Natural – COOPERNATURAL	Picada Café, RS	ECOVIDA
Cooperativa de Sucos Monte Vêneto	Cotiporã, RS	ECOCERT
Cooperativa Vinícola Aurora LTDA.	Bento Gonçalves, RS	ECOCERT
Cooperativa Vinícola Garibaldi Ltda	Garibaldi, RS	IBD
Econatura Produtos Ecológicos e Naturais LTDA.	Garibaldi, RS	ECOCERT
Irmãos Molon LTDA.	São Marcos, RS	ECOCERT
Marina Gallian Sucos ME	Bento Gonçalves, RS	ECOVIDA
Salete Terezinha Arruda da Silva – EPP	Garibaldi, RS	ECOVIDA
Vinícola D'Bastiani LTDA ME	Nova Roma do Sul, RS	ECOVIDA
Vinícola de Cezaro LTDA	Farroupilha, RS	ECOVIDA
Vinícola Mena-Kaho LTDA. – EPP	Bento Gonçalves	ECOCERT

Source: Brasil, MAPA, 2022 and Associação de Certificação Instituto Biodinâmico (IBD). Available at: https://www.ibd.com.br/selo-demeter/. Subtitle: IBD: Associação de Certificação Instituto Biodinâmico; ECOVIDA: Associação Ecovida De Certificação Participativa; ECOCERT: Ecocert Brasil Certificadora.

As it can be seen in **Table 1**, it is allowed for organic wines to have more sulfur dioxide added than other classifications.

As organic wines are specially based in its agriculture and not in the winemaking process, the vineyards which are managed organically are usually healthier, as the soil it grows in, with no deposit increase of pesticides residues. Farmers are less exposed to toxic substances, but the lack of fungicide and herbicides can also propitiate fungal diseases, as pests can cause more severe damage in vineyards, when compared to regular viticulture. Fungal diseases are more likely to happen in wet regions, therefore organic vineyards are more likely to be found in warm and dry regions.

BIODYNAMIC WINES

Some authors consider biodynamic (BDN) wine as an extension of organic wine (MASOTTI *et al*., 2022). In the year of 2020, Brazil had 3388 hectares of crops under biodynamic agriculture (PAULL and HENNIG, 2020).

The main regulators and associations of biodynamic wine are Demeter - based in Germany, but present in several parts of the world - Biodyvin (Sindicato of Vineyards in biodynamic culture process) and the Renaissance des Appellations, both in France - the latter, although not a certification party, it organizes events and tastings to promote the biodynamic wine culture, and was founded by Nicolas Joly (CEREJA, 2019).

Biodynamic agriculture emerged from a series of eight lectures given by the Austrian philosopher Rudolf Steiner (1861-1925) in 1924 in a city Poland. The course was requested by farmers who were noticing decline of plants (smell and taste), soil (fertility) and animals (health) with the use of new technologies (KOEPF, 1993; SCHELLER, 2000).

According to Steiner, the method of biodynamic cultivation consists in considering property as an agricultural organism. Its different components (soil, water, plants, animals and man) all work together and understand each of them, their potential and its limitations. The producer and his community can become independent as for seeds and fertilizers, where lasting soil fertility is the main point when this mode of cultivation is sought, together with high biological activity (CARPENTER-BOGGS, 1997).

Taking it into account, biodynamic wines are produced with grapes cultivated in accordance with Rudolph Steiner principles of biodynamic agriculture. Steiner, as mentioned above, set the foundation for an alternative agriculture, which, according to his lectures, could ‘heal the earth’. Therefore, with this idea, he developed the idea of biodynamic agriculture, which culminated in the publication of BioDynamic Farming and Gardening by Ehrenfried Pfeiffer in 1938 (MOORE, 1997; PAULL, 2011).

Steiner made a connection among spirituality and science to have a complete view of nature. Vineyards would be seen as a whole and living organism. Therefore, organic applies as a part of this definition (DIVER, 1999).

The purpose of Biodynamic agriculture is that agriculture practicing productivity provides health from the overall configuration of the farm, which produces by its own means everything it needs. According to biodynamic agriculture, farming is the expression of the encounter between man and nature, which actively affects natural processes. Among the principles of biodynamics, the maintenance of fertility of the soil is important, and it makes plants healthy in a way that they can resist disease and pests and therefore produce the highest quality food possible (DIVER, 1999; PAULL, 2011; CEREJA, 2019).

Moreover, biodynamic agriculture considers the planet globally and its relationship with the cosmos; this knowledge is not acquired overnight but only through habit to the observation of nature and its laws. Nowadays, ecological knowledge is slowly being acquired, but biodynamics preach that we are still far from understanding life in all its manifestations.

Besides being a way of growing without chemical fertilizer or without poisons, biodynamic agriculture is first characterized by a conscious use of natural forces (KOEPF, 1993; SCHELLER, 2000; JOLY, 2008).

Therefore, observing natural production, three fundamental expressions of this natural force appear to be relevant. According to BDN, the release in the land of nutrients necessary for the plant are related to the inspiration from the atmosphere to the earth by means of plants. This system self-regulates in all living organisms (KOEPF, 1993; SCHELLER, 2000).

The principle of giving back to the earth what you take is not a fundamental idea of biodynamic but of chemistry. The fundamental principle of biodynamics is to activate life in the earth so that the substances present in earth in quantities enormously higher than the need can be released and assimilated by plants to the extent necessary. This natural process takes place thanks to earthworms, worms and microorganisms and every intervention must have the purpose of protecting and intensifying this "micro stall". The inspiration of substances from the atmosphere is the second natural process. Microorganisms present in plants play a key role in the winemaking process, as they are responsible for most production (CARPENTER-BOGGS, 1997; CARPENTER-BOGGS *et al*., 2000; ZALLER and KÖPKE, 2004).

Within the general principles of biodynamic agriculture, there is farm structure, which may be tending towards a closed cycle and respect for the natural balance with maintenance of soil fertility using soil improvers and organic fertilizers, crop rotation, sowing for green manure and permanent land cover and the use of non-invasive tillage. The use of synthetic chemicals is forbidden, and breeding shall respect the nature of the species and have a balanced relationship between heads and usable areas (REEVE *et al*., 2005).

Composting either in heaps with biodynamic preparations or with surface treatments respecting the lunar and planetary calendar for sowing and cultivation operations within non-destructive soil work and fertilization through special green manuring (CEREJA, 2019).

BIODYNAMIC PREPARATIONS

According to Steiner, nine preparations for fertilizers are allowed to be used in biodynamic agriculture, which are numbered from 500 through 508 (Table 4). Farmers which apply biodynamic agriculture in their field use these minerals, plant, animal manure extracted preparations to liven up the soil and stimulate plant growth in small quantities (CARPENTER-BOGGS, 1997).

Table 4 - Biodynamic compost preparations

NUMBER	PREPARATION
500	Horn-manure
501	Horn-silica
502	Yarrow blossoms (*Achillea millefolium*)
503	Chamomile blossoms (*Chamimilla officinalis*)
504	Stinging nettle (whole plant in full bloom) (*Urtica dioca*)
505	Oak bark (*Quercus robur*)
506	Dandelion flowers (*Taraxacum officinale*)
507	Valerian flowers (*Valeriana officinalis*)
508	Prepared from silica-rich horsetail plant (*Equisetum arvense)*

Source: Authors, 2023

The first, preparation number 500, is a horn-manure made from cow manure which ferments in a cow horn that is buried in the soil for six months through autumn and winter. It is used as a soil spray to promote root growth and humus formation (DIVER, 1999).

The second, preparation number 501, is a horn silica made from powdered quartz (wrapped in a cow horn and covered in the soil for six months through spring and summer) which is employed as foliar spray to promote and regulate growth. Preparations from number 502 to 507 are used to make manure. The number 508 is used as foliar spray to suppress fungal diseases in plants. (CARPENTER-BOGGS, 1997; DIVER, 1999).

These preparations made from medicinal plants and minerals are applied in diluted doses (homeopathic), a great differential of the method, being used in the composts, in the soil and in the plants. Many works demonstrate the influence of the preparations in the compost, in the microbiology of the soil, in the cultures and in the lower environmental impact (CARPENTER-BOGGS *et al.*, 2000; ZALLER and KÖPKE, 2004; BOTELHO *et al.,* 2016; REGANOLD and PALMER, 1995).

According to Reeve *et al.* (2015), biodynamic preparations can improve the vegetative-reproductive equilibrium of plants, raising sugar levels, total polyphenol and anthocyanin concentrations of grapes.

The calendar used in BDN agriculture is developed by a German researcher, Maria Thun, who researched for over fifty years the influence of stars in agricultural systems, as the influence it has in bees and weather prediction. This calendar is based in astronomy (JOVCHELEVICH and VIDAL, 2016). Biodynamic calendars are complex, and it divides the year in days which are favorable, others not, once considering different aspects to agricultural work. These divisions are defined by the moon movement around the Earth, in cycles of 27 days, and by the movements of planets in constellation context. Therefore, planetary influence also plays a key role in biodynamic practices. The perception that celestial influences plant growth is part of biodynamic understanding that slight energy forces affect biological systems. However, there are still conflicting points of view concerning which lunar, planetary and stellar influences should be followed (DIVER, 1999).

Therefore, a biodynamic calendar is practical and empirical knowledge applied into a calendar. A drawing of the influence of the lunar cycle was performed in plantations, arriving at a cycle of days called root, leaf, flower and fruit. Depending on whether the day it flower, fruit, root or leaf and some tasks are more suitable and others less - such as sowing, planting, bottling - and some crops are more suitable than others, such as roots or fruits. When the moon is

waning, the energy is turned towards the earth, and the roots develop further, for example (CEREJA, 2019; CRAVERO, 2019).

Biodynamic wines are composed of grapes cultivated with biodynamic agriculture, as they grow within biodiversity and are chemical-free. In the process of vinification, fermentation happens spontaneously, and it is not usual to control the temperature during this step. The most arises from indigenous yeast presented in the grapes, which are specific and diverse from vine to vine. Therefore, it is not allowed to inoculate the use of selected yeast manufactured industrially, as it is not allowed: acidification / de-acidification, sweetening, concentration methods such as reverse osmosis or freezing (JOLY, 2008).

Still during vinification, no sterile filtration is allowed (filters below 2 microns) and the use of sulfur dioxide is a crucial issue among biodynamic wine regulations around the world some manufacturers use it in small quantities while others, use none as a matter of a convention and a matter of principle, a hallmark that distinguishes biodynamic production from the conventional (CRAVERO, 2019).

According to Vargas et al. (2022), biodynamic was first introduced in Brazil by farmers which left Germany in the end of the decade of 30, but it was only in the beginning of the decade of 70 that it started to be executed. The farm where biodynamic agriculture was firstly applied gave birth to the first and largest Brazilian certifier, the Associação Instituto Biodinâmico (IBD) (BERTALOT, 2004). In the south of the country, biodynamic agriculture is represented by Associação de Agricultura Biodinâmica do Sul (ABDSul), which was founded in the year of 2021. This organization performs Biodynamic and Organic PGS certification, and it has four farming associations with Demeter certification (VARGAS *et al.*, 2022).

NATURAL WINES

Natural wine is not subject to any international regulations. However, the demand for this wine is only growing. Natural wines were born from the need of an ethical and deontological commitment of winemakers to the land and consumers. Natural wines are used from ancient oenological practices, refuting any industrial method of viticulture and vinification. Therefore, they express all the richness of their terroir and manifest an aromatic palette different from the

standards of other labeled, industrial, and classified wines. The original character of these wines and the typicality of their organoleptic properties necessarily imply new tasting practices and new terminologies (MOUTAT, 2018).

Thus, natural wine production involves specific wine-growing practices refusing any use of chemical fertilizers and pesticides or weed killers. As it happens with biodynamic winegrowers, natural wine producers do not add any additives to their wines; the only manipulation remaining are the management of the volatile oxygen and acidity of the vats and barrels. The harvest is strictly manual, with sorting before vatting. Filtering and fining are not authorized, and the equipment must be strictly cleaned before handling musts and wine (this is to avoid any bacterial contamination) (MAIOLI *et al.,* 2021; FRITZ *et al.,* 2021; GONZÁLEZ and PARGA-DANS, 2020).

These unique organoleptic properties, as they also happen with biodynamic wines, lead to new tasting practices, and require appropriate analysis grids: since natural wine may contain CO_2 residues from fermentation. These procedures make natural wine a unique sensitive object endowed with unique organoleptic characteristics: its taste properties are those transmitted to it by the grapes and its flavors come from its terroir of origin. The mouth presents a supple structure and aromas of fresh and crunchy fruits, thanks to the carbonic maceration. As for the color, it turns out to be rather cloudy and matt, with some deposits (due to the absence of fining and filtering) (MAIOLI *et al.,* 2021; FRITZ *et al.,* 2021; PICCHI *et al.* 2020).

There is, in addition to all the differences in both planting method and winemaking per se, regarding natural wine (in general, including both organic and biodynamic) versus standard wine, the matter of knowledge in the tasting aspect. Characteristics considered as defects in industrial wines are not evaluated in this way in natural wines. To taste a natural wine, one must forget about all the aspects studied, learned, and reproduced in sommelier schools and awards around the world. Since wine is unfiltered, for example, it will be cloudy, obviously varying in intensity from one to another (MAIOLI *et al.,* 2021; FRITZ *et al.,* 2021; PICCHI *et al.* 2020).

Besides, due to lack of filtration, stabilization, crystals, lees and residues of the most diverse causes may be found in the wine, which are formed during the

process, such as those derived from yeasts. Therefore, grapes, yeasts and bacteria residues remain in wine. Aroma and flavor are never so obvious when compared to traditional wines, as they can take time until we get used to the natural wine wheel of aromas. Specifically linked to natural winemaking, some of the main villains of those considered "defects" are Brettanomyces, oxidation, high volatile acidity, loss of acidity, development of acetaldehyde, ethyl acetate, turbidity (MAIOLI *et al*., 2021; FRITZ *et al*., 2021).

Fritz *et al.* (2021) evaluated wine quality under integrated, organic and biodynamic management and it was found that in the descriptive sensory analysis, the wines derived from biodynamic, organic and integrated viticulture were perceived to be slightly different. The one from the biodynamic treatment showed a significantly higher aroma intensity when compared to the wine which has undergone integrated treatment. The wine from the biodynamic treatment was also perceived as being the fruitiest and the freshest, but differences were not significant (MAIOLI *et al.,* 2021; FRITZ *et al.,* 2021).

Another study, carried out by Picchi *et al.* (2020) evaluated the impact of biodynamic and conventional winemaking processes, using biodynamic grapes, on several parameters, including sensorial analysis. Biodynamic wine was found to be perceived as more intense for the sweetness, cherry and floral odor, wood odor and sensory flavor.

Maioli *et al.* (2021) conducted a study for a proposal of elaboration of a methodological approach to evaluate the impact of the organic, biodynamic, and conventional production processes on the intrinsic and perceived quality of a typical wine. It was found that, among the fourteen Chianti DOCG wines studied, the differences of the intrinsic, perceived quality, and typicality level of the respective wines, did not depend on the type of management. The comparison of traditional, organic, and biodynamic wines demonstrated that the conventional ones showed more similarity regarding chemical composition, sensory characteristics, and typicality.

NATURAL, ORGANIC AND BIODYNAMIC WINES WORLDWIDE

According to González and Parga-Dans (2020), even though the natural wine department is small, it is a rapidly growing sector. As it is a complex trend, there is a necessity to fully develop concepts regarding the theoretical approach within natural wine, as it can, within its market, be either sustainable and ecological, as it can include biodynamic and sulphite-free wines, despite the local and / or international certification.

There are few academic contributions regarding natural wines, therefore a nonacademic approach can be found regarding the topic. These approaches are produced by wine bloggers, specialists and professionals of the area which usually approach the topic to a wider audience. In Brazil this is not different. The main data regarding natural wine, since there is no organization to establish a certification seal, as it goes to organic wines, is more in a mouth-to-mouth disclosure.

According to Medeiros *et al.* (2014) recent data suggests that there are farms producing grapes for biodynamic systems, but they are not certified.

BRAZILIAN PANORAMA

The first biodynamic wine was produced in 2012 in the state of Santa Catarina. The winery responsible for the product had at the time, 14 hectares of grapes under biodynamic farming (RAUTA *et al*., 2014).

In Brazil there is a growing trend of consumption of high-quality wines and organic wines (ARAUJO *et al.,* 2017).

As stated above, there is no regulation regarding natural wines in Brazil, as there are few registers in the scientific literature regarding the topic, to our knowledge. Demeter International is an organization of certification for biodynamic agriculture, which has associations in different parts of the world. Demeter Biodynamic Certification, used in more than 50 countries for verification of producers that meet international standards of biodynamic production and processing.

The Demeter certification was established in 1928, being, therefore, the first eco-label for organically produced food. In Brazil, Demeter certifications are issued by Associação de Certificação Instituto Biodinâmico (IBD) and Brazilian Wines

certified by Demneter are presented in **Table 3** with the abbreviation of the certified unit which provides this certification in the country. Certified Organic Wineries appear with the abbreviation of ECOVIDA and ECOCERT, two certifying units.

Nevertheless, small wineries produce natural, organic and biodynamic wines but are not enrolled in any of the certifying units. They are part of the movement of producers of natural wines in Brazil, as well as members of the Annual Fair "Naturebas" promoted annually in Brazil, where producers meet to exchange experiences, and they are listed in **Table 5**.

Table 5 - Brazilian Natural Wine Producers present in the Brazilian National Fair of Natural Products.

Winery	Location
VINHEDO MONTE BELO (VMB)	Monte Belo do Sul / Vale dos Vinhedos -RS
VITA ETERNA	Pinto Bandeira-RS
DE LUCCA	Caçapava do Sul-RS
VINHA UNNA	Pinto Bandeira-RS
VIVENTE VINHOS	Colinas-RS
FAMIGLIA BOROTO	Garibaldi-RS
BIOSABORES	Bento Gonçalves-RS
CANTINA MINCARONE	Porto Alegre-RS
ERA DOS VENTOS	Caminhos de Pedra/Bento Gonçalves-RS
VALPARAISO VINHOS E VINHEDOS	Barão/Serra Gaúcha-RS
CASA VICCAS	Serafina Corrêa-RS
FACCIN VINHOS	Monte Belo do Sul-RS
VIVÁ VINHOS	São Francisco de Paula – Campos de Cima da Serra-RS
MONTE VINHOS DE AUTOR	Porto Alegre-RS
VINHOS DE CEZARO	Farroupilha – Serra Gaúcha
ARTE DA VINHA	Carlos Barbosa/Serra Gaúcha-RS
BELLAQUINTA	São Roque-SP
VINHOS ARTESANAIS VANESSA MEDIN	Serra Gaúcha-RS
OUTROVINHO	Colinas-RS
CASA ÁGORA	Pinto Bandeira-RS
VINHO DA BRUXA	Serra Gaúcha-RS
MONTANEUS – VINHOS ARTESANAIS	Serra Gaúcha-RS
FINCA TUÍRA	Viamão-RS, Brasil
ATELIER CARRAU	Santana do Livramento | Serra Gaúcha-RS

Source: NATUREBAS, 2022.

In addition, in order to build a sense of historic facts regarding natural wines movement in Brazil, in the year of 2015 Brazil hosted the I Encontro Franco-Brasileiro de Vinhos Naturais, where the French Pierre Overnoy, considered by many the natural wine master, (CEREJA, 2015). In **Table 6** there's a list of participants of that event, national and internationally.

Table 6. Participants of I Encontro Franco-Brasileiro de Vinhos Naturais

French Participants	Brazilian Participants
Emmanuel Houillon and Pierre Overnoy from *Domaine Houillon-Overnoy* Winery	Marco Danielle from *Tormentas* winery
Jean and Agnés Foillard from *Domaine Jean Foillard* Winery	Mauricio Ribeiro from *Vinhedo Serena* Winery
Eric and Marie Pfifferling from *Domaine L'Anglore* Winery	Lizete Vicari from *Domínio Vicari* Winery
Pierre and Catherine Breton from *Domaine Breton* Winery	Eduardo Zenker from *Arte da Vinha* Winery
Sebastien Bobinet and Emeline Calvez from *Domaine Sebastien Bobinet* Winery	Marina Santos from *Vinha Unna* Winery
Patrick and Mireille Meyer from *Domaine Julian Meyer* Winery	Luís Henrique Zanini from *Era dos Ventos* Winery
Marcel Richaud from *Domaine Richaud* Winery	

Source: CEREJA, L., 2015.

It is important to consider that we do not find these wineries in the lists of certifications which were brought in this study, by recognized certifying units. Therefore, it corroborates the premise that not all natural winegrowers have certification, and that the movement requires more studies to be scientifically and formally recognized in Brazil. Some of the Natural Winemakers in Brazil are turning into biodynamic agriculture, slowly. Others, when contacted, claimed to be unable to cultivate *Vitis vinifera* wine within biodynamic agriculture in Brazil.

One of the main issues regarding grape cultivation in Brazil is its climate, according to scientific knowledge. The main regions targeted to viticulture are in the south and southeast of Brazil, where it is known to have high humidity and temperature, as it rains during the entire cycle of the vine (SÔNEGO *et al*., 2005), which makes it harder not to add chemicals to prevent fungal infestation.

However, in the past years the number of wineries turning into natural, organic, or biodynamic winemaking has grown.

CONCLUSION

The market niche of consumers is eager for sustainable products, which include organic, biodynamic, and natural foods and beverages, combined with the growing Brazilian trend to consume better quality wines. We could see in this work that, although not yet completely regulated, Brazilian winemakers concerned with this market and the environment are meeting the trends worldwide and although shining, turning it into a growing sector.

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