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Article

Conflicts Between Neighbors: Viticulturists and Soybean Farmers at the Pampa Biome – RS, Brazil

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ABSTRACT

The Pampa Biome represented in last four centuries a specialization in cattle production, with high historical, socioeconomic, and cultural similarities between Argentina, Brazil, and Uruguay, the countries that share the same Biome. However, from the twentieth century onward the scenario changed. Agriculture and forestry, because of the higher and faster financial returns are now the most important in socio and economic levels. From 2000 onward, a movement of expansion in Brazilian viticulture has highlighted new potential borders, in this case, replacing natural pastures in the Pampa Biome. The significant growth of grapevine area can be illustrated by the doubled surface, reaching 1560 hectares, and the number of vineyards grew from 7 to more than a 100. In 2010 it was created the association "Vinhos da Campanha" to represent the region, to structure the geographical indication and to improve the visibility of this terroir and their physical and environmental conditions. However, viticulturists did not expect a huge threat to their vineyards. In the seven past years, the 2,4-D based herbicides spread over transgenic soybean plants cultivated nearby vineyards is causing the decrease of fruit production, presence of herbicide residue in harvested fruit, killing parts or even the entire vineyards: all damages representing monetary losses. Finally, due to the losses and the underway lawsuits, the community cohesion has been broken apart: viticulturists increased cohesion and union among themselves, but social cohesion between them and soybean growers no longer exist in several areas of Rio Grande do Sul state. Later on similar scenario reached other Brazilian States and other fruit species.

Keywords: vineyards; transgenic soybean; environment; campanha gaúcha.

RESUMO

O Bioma Pampa representou nos últimos quatro séculos uma especialização na pecuária, com altas semelhanças históricas, socioeconômicas e culturais entre Argentina, Brasil e Uruguai, países que compartilham o mesmo Bioma. No entanto, a partir do século XX, o cenário mudou. A agricultura e a silvicultura, por causa dos retornos financeiros mais altos e mais rápidos, são hoje os mais importantes em níveis socioeconômicos. A partir de 2000, um movimento de expansão da viticultura brasileira tem destacado novas fronteiras potenciais, neste caso, substituindo pastagens naturais no Bioma Pampa. O crescimento significativo da área de videira pode ser ilustrado pela superfície duplicada, chegando a 1560 hectares, e o número de vinhedos cresceu de 7 para mais de 100. Em 2010 foi criada a associação "Vinhos da Campanha" para representar a região, estruturar a indicação geográfica e melhorar a visibilidade desse terroir e suas condições físicas e ambientais. No entanto, os viticultores não esperavam uma grande ameaça para seus vinhedos. Nos últimos sete anos, os herbicidas à base de 2,4 D utilizado nas plantas transgênicas de soja cultivadas nas proximidades estão causando a diminuição da produção de frutas, presença de resíduo de herbicida em frutas colhidas, ou até mesmo todos os vinhedos: todos os danos que representam perdas monetárias. Finalmente, devido às perdas e às ações judiciais em andamento, a coesão comunitária foi quebrada: viticultores aumentaram a coesão e a união entre si, mas a coesão social entre eles e os produtores de soja não existe mais em várias áreas do Estado do Rio Grande do Sul. Mais tarde, cenário semelhante atingiu outros Estados brasileiros e outras espécies frutíferas.

Palavras-chave: vinhedos; soja transgênica; meio ambiente; campanha gaúcha.

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1. Introduction

The Pampa biome occupies approximately 750,000 km2, including parts of Argentina, Uruguay, and Brazil (Figure 1). In Brazil, the Pampa occupies approximately 176,500 km² and it is restricted only to the state of Rio Grande do Sul representing 63% of state's area. Known as Campos do Sul or Campos Sulinos, the Pampa region was also considered as a biome in 2004 (IBGE, 2004). The Pampa biome is formed by four main sets of natural rural phytophysiognomies: Campaign Plateau, Central Depression, South Plateau-Rio-Grandense and Coastal Plain (Figure 1), which present different soil and vegetation cover compositions (IBGE, 2004).

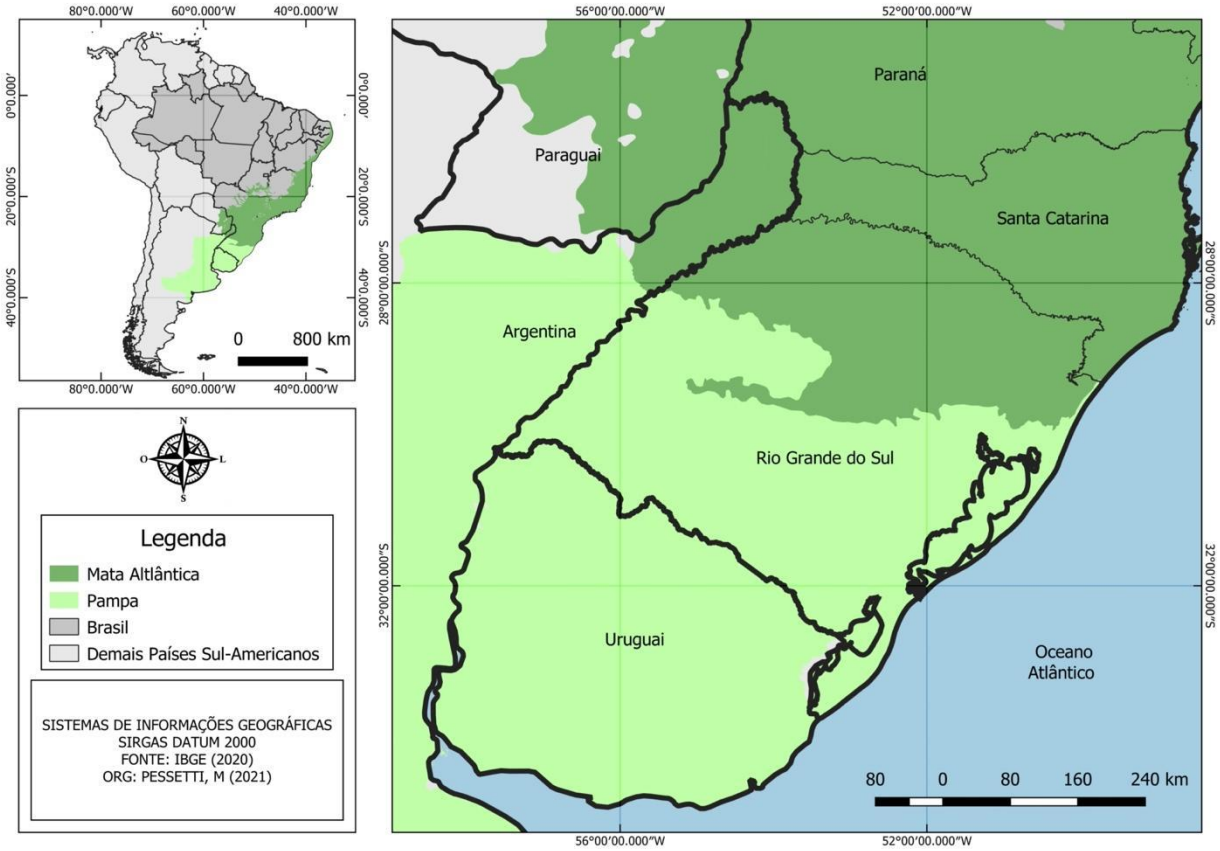

Figure 1. The Figure depicts South America (left image) and the south of Brazil maps and its borders countries, Uruguay and Argentina (tight image) where the Pampa biome occurs (pale green). Source: Elaborated on the basis of Sistemas de Informações Geográficas SIRGAS DATUM 2000. Instituto Brasileiro de Geografia e Estatística (IBGE) (2020). PEZETTI, Mateus; MINUZZI, João Davi Oliveira; SÁ, Débora Nunes de (2021).

Plains, small mountains, rocky hills, and gently rolling relief are included in the Pampa landscapes, accompanied by riparian and hillside forests, shrubby formations, and wetlands[1]. The Pampa biome has a history of agrarian occupation and of nurturing the social development of the *gaucho*[2], who managed extensive livestock systems, especially cattle and sheep. Thus, the socio-productive and man–nature relationship dynamics in this biome have allowed the Pampean landscape to be maintained for generations. According to studies done by several authors, "the biome biodiversity is represented by approximately 3000 plant species, including a wide variety of grasses and legumes, as well as 500 species of birds, and more than 100 species of land mammals"[3].

[1] Paulo A. Zarth e Marcos Gerhardt, "Uma história ambiental do pampa do Rio Grande do Sul", em Lavouras de destruição: a (im)posição do consenso, coords. Althen Teixeira Filho (Pelotas: UFPEL, 2009), 249-295.
[2] Gaucho is the nickname for the inhabitants of the Pampa region and have a very unique folklore.
[3] Ilsi Boldrini, "A flora dos campos do Rio Grande do Sul", em Campos sulinos: conservação e uso sustentável da biodiversidade, coords. Valério de Patta Pillar, Sandra Cristina Müller, Zélia Maria de Souza Castilhos e Aino Victor Ávila Jacques (Brasília: Ministério do Meio Ambiente, 2009), 63-77.

The Pampa Biome represented in last four centuries a specialization in livestock, with high historical, socioeconomic, and cultural similarities between north of Argentina, south of Brazil, and Uruguay, the countries that share the same Biome.

However, at the beginning of the twentieth century, cattle ranching lost importance in comparison to agriculture and forestry, because of the higher and faster financial returns of the last two. It can be showed in percentages how the land is divided: pastures occupy 46,48% of the territory, followed by agriculture (16,67%) and forestry (3,37%)[4].

According to IBGE—Brazilian Institute of Geography and Statistics, "the area planted with soybeans in the municipalities belonging to the Pampa biome in Brazil increased from 686,000 hectares in 2000 to 2.67 million hectares in 2019"[5] This phenomenon can be explained by the high economic value of soybeans in the national and international markets.

However, these changes in the landscapes at the Pampa Biome have another actor in the scene, mainly in the Campanha Region, the viticulture. From 2000 onward, a movement of expansion and structuring in Brazilian viticulture has highlighted new potential borders, in this case, replacing natural pastures in the Campanha Gaúcha by vineyards.

The significant growth of grapevine area can be illustrated by the doubled surface, reaching in 2015 an amount of 1560 hectares, and the number of vineyards that grew from 7 to more than a 100. This is a drastic change in a historical landscape because it involves a very different structure from livestock and, consequently, environmental changes, aspects that must be analyzed.

2. The Campanha Gaúcha

In this context, it is important to show a geographical and historical description of the region. The Campanha occupies a geographical area of 44,365 km^2 and covers the municipalities: Aceguá, Alegrete, Bagé, Barra do Quaraí, Candiota, Dom Pedrito, Hulha Negra, Itaqui, Lavras do Sul, Maçambará, Quaraí, Rosário do Sul, Santana do Livramento e Uruguaiana. (Figure 2)

The history of the grapevines in the region goes back to the seventeenth century when they reached the states of Rio Grande do Sul (RS) and Santa Catarina (SC). The introduction of vines in the state of RS, was done by Spanish Jesuits. Under Spanish rule at that time, the priests and brothers of the Jesuit Province of Paraguay introduced varieties of *Vitis vinifera* from Castile to the Tape Missions in Rio Grande do Sul, located on the central plain and the slope of the years of 1625 and 1635. Priest Roque Gonzalez de Santa Cruz S.J., recorded the existence of viticulture in the Mission of Saint Nicholas in 1626; there are also other records of viticulture in the 30 indigenous People and Seven Missions located in the northwest of RS, during the 17th and 18th centuries.[6]

The first registered winery in the area was founded by José Marimon started its vineyards in 1882 and in 1888 was producing their own wine, in Quinta do Seival, where today is the municipality of Candiota, within the Campanha region.[7]

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[4] Reges Echer, José Antônio Weycamp da Cruz; Carina Costa Estrela, Marcelo Moreira e Filipe Gravato, "Usos da terra e ameaças para a conservação da biodiversidade no bioma Pampa, Rio Grande do Sul", Revista Thema (2016): 4–13.

[5] João Garibaldi Almeida Viana, Rafaela Vendruscolo, Vicente Celestino Pires Silveira, Fernando Luiz Ferreira de Quadros, Mariana Patricia Mezzomo e Jean Fraçois Tourrand, "Sustainability of Livestock Systems in the Pampa Biome of Brazil: An Analysis Highlighting the Rangeland Dilemma", Sustainability 2021 (2021): 1-24.

[6] Ivanira Falcade, A paisagem como representação espacial: a paisagem vitícola como símbolo das indicações de procedência de vinhos das regiões Vale dos Vinhedos, Pinto Bandeira e Monte Belo (Brasil). Tese de Doutorado em Geografia, Universidade Federal do Rio Grande do Sul.

[7] Rogerio Dardeau, Gente, lugares e vinhos do Brasil (Rio de Janeiro: Mauad X, 2020).

However, the wine at the Campanha Gaúcha began to strengthen in the 1980s, and gaining new momentum in the 2000s, with the growth in the number of grape and wine producers, expanding the activity to several municipalities in the region. Nowadays fourteenth municipalities of Campanha region cultivate vineyards. Several of the large wineries based in the Serra Gaúcha (state of Rio Grande do Sul), which is the largest wine production area in Brazil, expanded they cultivated grapevine areas to the Campanha.

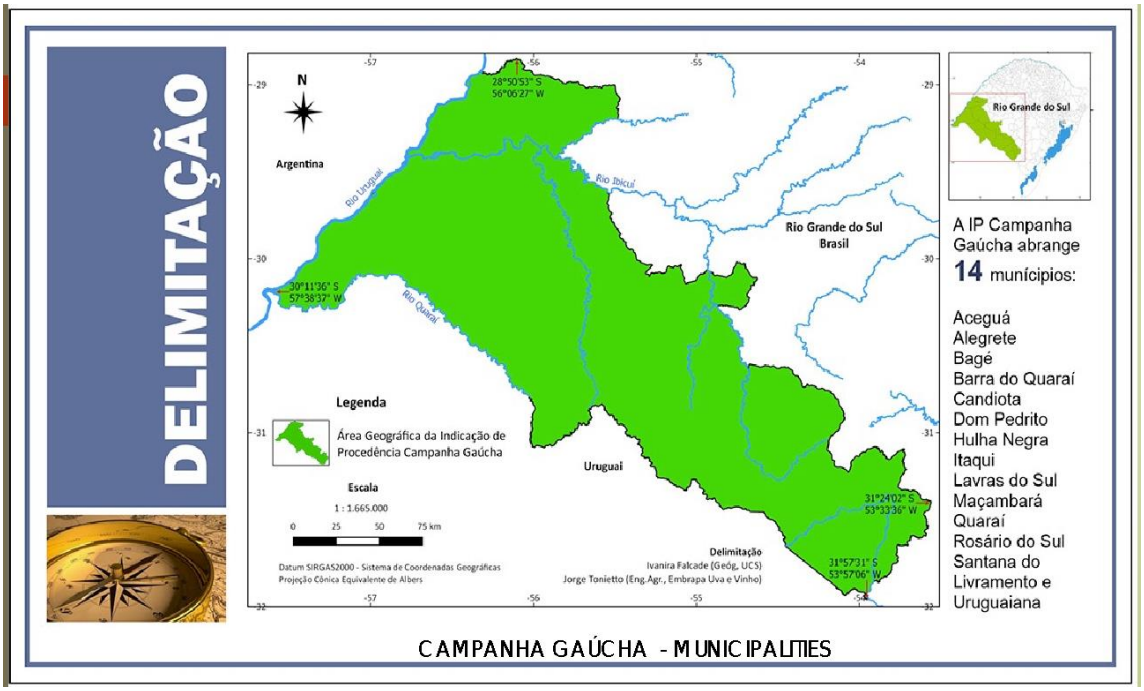

Figure 2. The map depicts south of Rio Grande do Sul state where the Campanha Gaúcha is located (green) and its borders. Source: Vinhos da Campanha[8]

With a subtropical climate type, Campanha Gaúcha is the hottest region in southern Brazil among the regions producing fine wines. In this wide region, even with variation, the climate that occurs around the IP (Appelation of Origin) Campanha Gaúcha, on a macroclimate scale, is a relatively homogeneous natural factor for viticulture grow.[9]

The area of vineyards with varieties of *Vitis vinifera* of the region reached 1,560.02 hectares (data from the Vitícola Register of 2015)[10], traditionally cultivated in espalier system. The area of Apellation of Origin of the Campanha Gaúcha that comprises a continuous area of 44,365 square kilometers is located between the coordinates 29º and 32º of Latitude South, and bordering limits with Argentina and Uruguay.

In this region the wine industry, unlike extensive livestock, is characterized by the power to add value in production, either by the increase of new products, or by the variety of wine production from different varieties of grapes, specific climate and soil conditions and the growing technology involved in the production of fine wines.

This combination of favorable natural conditions helps the grapes to mature fully, developing a higher content of polyphenols and sugar in the grapes. This means that the wines have more structure generated by higher alcohol and tannin content, characteristics that fall within the standards currently established by the market for quality wines, and that makes the "Campanha" a special *terroir*.

[8]Vinhos da Campanha. Campanha Gaúcha. https://www.vinhosdacampanha.com.br/campanha-gaucha/ (Accessed April 24, 2022.)
[9] Samar Velho da Silveira e José Fernando da Silva Protas, ed., Vinhos finos da região da campanha gaúcha: tecnologias para a vitivinicultura e para estruturação de indicação geográfica. Bento Gonçalves, RS (Bento Gonçalves: Embrapa Uva e Vinho, 2021.
[10]Flores, ShanaSabbado. 2011. Desenvolvimento territorial sustentável a partir dos territórios do vinho: O caso dos "Vinhos da Campanha".Master's degree, UFRGS. 97-99

Campanha Gaúcha is the second largest pole producing fine wines in Brazil, accounting for 31% of production, coming after the Serra Gaúcha, where 59% of the national production is concentrated. In other words, the State of Rio Grande dos Sul is the main producer of fine wines in Brazil. According to data from the Vitícola Register (2015) the last published, the area of vineyards with varieties of *Vitis vinifera* of the Campaign totals 1,560 ha (Figure 3).

However, these data are underestimated, as the grapevine cultivate areas and wine production have been growing since then. The vines are traditionally grown in espalier, which facilitates mechanization and provides sanity in the vineyard by allowing better air circulation and incidence of solar rays in plants.

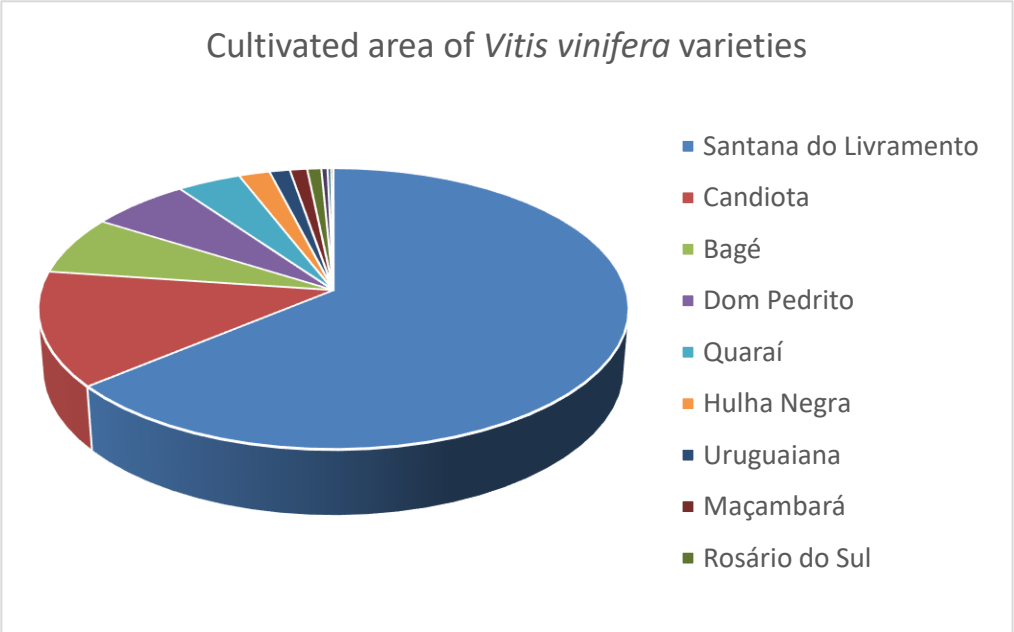

Figure 3. Cultivated area of grapevine varieties in Campanha Gaúcha region, Rio Grande do Sul, Brazil. Source: Adapted from Silveira; Protas (2021)[11]

Founded in 2010, the Association of Fine Wine Producers of the Campanha Associação Vinhos da Campanha in Portuguese), according to the website aims to: "Improve the production techniques in the vineyards, to standardize the quality of the grape and increase its competitiveness. It is also responsible for training producers in business management and strengthening the sector through market access actions and commercial promotions.The Association seeks improvements in the marketing results of producers and wineries to consolidate the image of the wines of Campanha Gaúcha as a reference in the quality of fine wines."[12]

The seventeen wineries that are associated to the Vinhos da Campanha Gaúcha can be seen on the folder of the association (Figure 3).

According to Flores, the foundation of the Association at the time was not only important to represent the region and structure the geographical indication, but also to represent the strengthening of ties between local actors related to wineries and the companies of Serra Gaúcha, already consolidated in the wine market, which contributed strongly to the consolidation of the region as a winegrower, a great legacy of this phase.[13]

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[11] Samar Velho da Silveira e José Fernando da Silva Protas, ed. 2021. Vinhos finos da região da campanha gaúcha: tecnologias para a vitivinicultura e para estruturação de indicação geográficaBento Gonçalves, RS. Bento Gonçalves: Embrapa Uva e Vinho.
[12] Vinhos da Campanha Gaúcha. Associação. https://www.vinhosdacampanha.com.br/associacao/ (Accessed March 31, 2022)
[13] Shana Sabbado Flores, "Desenvolvimento territorial sustentável a partir dos territórios do vinho: O caso dos 'Vinhos da Campanha'" (Master's degree, UFRGS, 2011).

The process to obtain the Apellation of Origin started in 2010 and ended in 2020 when the National Institute of Industrial Property (INPI) – recognized the Apellation of Origin of the wines from the Campanha Gaúcha.

Figure 4. Folder of the Association Vinhos da Campanha illustrates the wineries of the Campanha Gaúcha region. Source: Exame[14]

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Besides livestock and viticulture, the Campanha is also well known in agriculture and forestry mainly with the large-scale production of soybeans and eucalyptus plantation. For example, the comparison of the harvest area of soybeans with the harvest area of grapes in 2018 for all the 14 municipalities reach 358,127 and 1404 hectares for soybean and grapes respectively.

The Campanha region currently shows a landscape, which by many can be considered idyllic, because the vineyards behave themselves as a harmonious landscape, without showing the big effects to the environment. On the contrary, transgenic soybean and extensive eucalyptus monocultures further increased the likelihood of adverse environmental impacts on the whole Pampa biome components.

[14] Exame. Vinhos da Campanha Gaúcha ganham Indicação de Procedência. https://exame.com/casual/vinhos-da-campanha-gaucha-ganham-indicacao-de-procedencia/ (Accessed April 25, 2022)

Figure 5. Photography of the Cooperativa Nova Aliança. Source: EMBRAPA[15]

3. Threats to Vines and Grapes – Contamination by 2,4-D Based Herbicide

Although viticulturists did not expect a huge threat to their vineyards coming with their neighbors' producers of transgenic soybeans, they arrived. The hormonal 2,4-D based herbicide is applied in the fields to eliminate the weeds before seed sawing and during soybeans development cycle. Even sprayed in transgenic soybean, due to its intrinsic drift properties, the 2,4-D can reach the vineyards kilometers far away.

Several factors can affect the distance that 2,4-D can spread, including inadequate method and inappropriate weather conditions of spraying time. Transgenic soybean varieties are not affected because contain bacterial resistant genes to that herbicide. However, other species can be damage, among them, grapevines, because they are not resistant to herbicides. Once 2,4-D based herbicides reach neighboring far away grapevine plantations, they can cause damage to the leaves and berries.

Some of the atrophies that 2,4-D herbicides cause in plants are: defoliation, cease to grow, plant death, decrease the number of fruit, do not bear fruit and presence of herbicide residues in fruits. The contamination of vines by 2,4-D based herbicide, one of the agricultural pesticides used in transgenic soybean cultivars, lead producers to harvest up to 40% less grapes than expected. The most affected region is the Campanha Region, on the border with Uruguay, where in the last 15 years a new wine pole has been established.

Considered one of the world's longest-foremost herbicides, 2,4-D has been marketed since 1945. In association with another herbicide, it gave rise to the "orange agent", widely used in the Vietnam War (1961-1971) as a chemical weapon by the United States Army.

At the time, the Americans' justification for using such a powerful weapon was that it was not a chemical weapon, but an herbicide capable of defoliating and removing the cover from the hideout of enemy soldiers. It looks that in Rio Grande do Sul, the goal of the soybeans growers seems to be the same: the enemy soldier, in this case, is buva (*Conyza bonariensis*), weed that compromises the soybean crop in the flowering period. The indiscriminate use of the herbicide accompanied the rampant expansion of soybean in the Pampa biome. Intriguingly and ironically, populations of buva resistant to glyphosate-based herbicides were previously selected by the same of management practice on transgenic soybean varieties resistant glyphosate-based

[15] EMBRAPA. Cientistas ajudam Campanha Gaúcha a obter selo de procedência para vinhos. https://www.embrapa.br/en/busca-de-noticias/-/noticia/6031942/cientistas-ajudam-campanha-gaucha-a-obter-selo-de-procedencia-para-vinhos (Accessed April 24, 2022)

herbicides[16]. Then, the seed industry replaced the transgenic varieties by new ones, nor resistant to 2,4-D. Thus, one of the questions is which will the next herbicide to be used on transgenic soybean varieties?

The problem of 2,4-D contamination on vineyards began about seven years ago and is related to transgenic soybean expansion in the southern half of Rio Grande do Sul.

In 2015, the State Prosecutor's Office (MPE) opened an investigation. The Prosecutor Anelise Grehs, coordinator of the Environmental Conflict Resolution Center (NUCAM), received the chemical test reports and the final report prepared by the State Department of Agriculture, Livestock and Irrigation. Reports of 80 grapevine plant collections were made in 56 rural properties. Of these, 69 tested positive for the presence of 2,4-D. The results refer not only to the Campaign, but also to cities in other regions such as Encruzilhada do Sul, in Serra do Sudeste, and Jaguari, near Santa Maria. "It's a state problem," the District Attorney said. However, the dispute was unsolved and contamination has happened every year and reach other species. For example, in 2019, residue analyzes carried out by the Laboratory of Analysis of Pesticides Residues (Larp), linked to the Secretary of Agriculture, Livestock and Rural Development of the State of Rio Grande do Sul - SEAPDR, indicated the presence of the herbicide 2,4-D in 92.3% of the 143 samples from 10 species, including grapevine[17]

One of the referrals under analysis is to strength rules by the Executive Office (Ministry of Agriculture, Agriculture, Farming and Food Supply), determining a minimum distance of spraying the 2,4-D from urban centers and sensitive cultures, like grapevine. According to Grehs she does not rule out a ban of the use of this kind of pesticides in the State: "If it is found that these other measures are not effective, this option is not ruled out through a judicial measure." [18]

Through complaints from winegrowers released by the press and by environmental organizations, the harmful effects of 2,4-D on vineyards can be figure out. Clori Giordani Peruzzo former president of the Vinhos da Campanha Gaúcha explains that damage was recorded in Quaraí, Dom Pedrito, Santana do Livramento, Candiota and Bagé, but vary according to the distance between grapes and soybean crops.

The average loss, however, is estimated between 30% to 40%.The projection of the crop break is made based on the vines that did not grow as they should, since the 2,4-D alters the development of leaves, branches and bunches. Peruzzo regrets the damage just when the grape trees were reaching the peak of production and quality of the grape, which only happens about fifteen years after planting: "Everyone is worried because it is impactful in the pocket. The vines, especially from fine grapes, require high investment and a lot of work. And now lose like that. Because catching a hailstorm is natures, but that's not right." [19]

Another example is the producer and consultant Sinval Fernandes, who cultivates 28 hectares of vineyards in Santana do Livramento, and he instructs six other producers in the region. On the words of Fernandes, for 28 years he has been encouraging viticulture in the Campanha. However, today, he fears that the big wineries will start leaving the region: "We fought so hard to spread and sell this idea of a profitable vineyard to the

[16] L. Vargas, M. A. Bianchi, M. A. Rizzardi, D. Agostinietto e D. Dal Magro, "Conyza bonariensis biotypes resistant to the glyphosate in southern Brazil", Planta Daninha (2007): 573-578.
[17] G1-RS, "Uso do herbicida 2,4-D é suspenso até o fim do ano pela Secretaria da Agricultura do RS". G1 RS https://g1.globo.com/rs/rio-grande-do-sul/noticia/2019/12/03/uso-do-herbicida-24-d-e-suspenso-ate-o-fim-do-ano-pela-secretaria-da-agricultura-do-rs.ghtml (Accessed June 12, 2020).
[18] Ministério Público do Rio Grande do Sul, "Reunião reforça recomendação expedida pela promotoria de Bagé e Nucam sobre o uso do agrotóxico 2.4-D". MPRS, https://www.mprs.mp.br/noticias/48098/ (Accessed April 27, 2022).
[19] Globo Rural. Agrotóxico da soja atinge parreiras e ameaça safra da uva no RS. https://revistagloborural.globo.com/Noticias/Agricultura/noticia/2019/01/agrotoxico-da-soja-atinge-parreiras-e-ameaca-safra-da-uva-no-rs.html/ (Accessed August 19, 2020).

agricultural community, and now we see this external factor with a very great concern, to the point of endangering our activity in the short and medium term, if we do not take action."[20]

Agronomist and rural producer Eveline Previtali came across her vineyards in Dom Pedrito, emitting the first signs of atrophy and plant retortion. The indication is that that in 2020 once again her property was hit by the drift of 2,4-D. She also grows olive trees in her property and in 2018 she has not harvested any olives. With sorrow she says: "Every year it's the same thing. It is misuse of the herbicide, int he case of other producers, but soybeans are always discussed by the bias of economic power. "This week, I've already spent almost R$ 20,000.00 (approximately USD 4,000) on amino acids to try to recover the vineyards and eliminate the herbicide".[21]

Valter Pötter is an owner of six properties, which together add up to 11,000 hectares in the region, he chose the name of a tree to baptize his resort – Guatambu. According to Liana Melo, Pötter has been reconciling three business fronts: viticulture, livestock and soybeans. The vineyards and winery occupy 36% of the area, but together they account for the group's higher financial return, tying with the resources generated by cattle, which, however, spreads over 50% of the family's property. The soybean crop occupies 19% of the 11,000 hectares and contributes 17% of the group. "Without using a single drop of 2.4-D in soybean plantations, Pötter has been recording a productivity higher than the average of the municipality: 48 bags (60 kg) per hectare against 27 bags per hectare, in Dom Pedrito".[22]

The risk of losing his vineyards, where he works with eight grape varieties, turned Pötter into a militant, declaring war on 2,4-D. At the beginning he tried the diplomacy, using rhetoric to convince his soy producers neighbors to adopt another type of management. After three years without results he assumed radicalism and became viscerally opposed to the use of the herbicide in soybean plantations in Rio Grande do Sul. It is from the top of his long experience as a soybean producer, begun in the 1950s, that Pötter decrees: "2,4-D needs to be suspended immediately".[23]

According to Pötter, the government does not control 'drift', surveillance it is difficult, and the losses of winegrowers grow annually. Vineyards in municipalities such as Dom Pedrito and Santana do Livramento suffered again in 2022 and, in localities such as Jaguari, some producers lost all production. "About 1 million grapes were destroyed in the Campanha region, totaling R$ 30 million in losses.

The attempt to recover plants affected by pesticides also raises costs. Hotel, gastronomy and wine tourism projects are still up to a solution for 2,4-D. Producers can't take it anymore," said the entrepreneur.

Due to the drift of 2,4-D, Rio Grande do Sul has been leading a battle, which, due to lack of consensus, ended up in court. The impasse led the State Prosecutor's Office (Public Prosecutor) to open a civil inquiry to investigate the damage caused in local fruit growing. Ten public hearings later, the standoff continues. In April 2019, the Prosecutor of the Environment, Alexandre Saltz, stipulated a period of one month for the state's soybean producers to explain themselves. The deadline ended on May 23. Nothing's been solved. "It's a situation, legally speaking, extremely complex," Saltz says, admitting that regardless of the decision that is made, both sides will be impacted.[24]

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[20] Idem, 2020.
[21] Carlos Rollsing, "Herbicida volta a causar atrofia em vinhedos e acirra crise entre produtores rurais". GZH, https://gauchazh.clicrbs.com.br/economia/campo-e-lavoura/noticia/2020/10/herbicida-volta-a-causar-atrofia-em-vinhedos-e-acirra-crise-entre-produtores-rurais-ckgw4jwu7000o015x9q76kai7.html (Accessed April 5, 2022).
[22] Liana Melo, "Lesão, mutilação e morte nos vinhedos". #Colabora, https://projetocolabora.com.br/ods15/agrotoxico-24-d-mutila-e-mata-em-vinhedos-no-sul/ (Accessed April 2, 2022).
[23] Projeto Colabora. Lesão, mutilação e morte nos vinhedos. Available at: https://projetocolabora.com.br/ods15/agrotoxico-24-d-mutila-e-mata-em-vinhedos-no-sul/. Accessed on: April 2, 2022.
[24] Liana Melo, "O veneno da soja contra os vinhos gaúchos". #Colabora, https://projetocolabora.com.br/ods15/vinhedo/ (Accessed April 27, 2022).

Valter Pötter, president of the Association of Fine Wine Producers of the Campanha Gaúcha explains that the situation is "critical." They are ending any possibility of diversification of cultures," he regrets.[25]

Figure 6.Without using a single drop of 2,4-D in the soybean crop, rural entrepreneur Valter Pötter combines different crops on his property. Source: Projeto Colabora[26]

4. Final Remarks

Drift associated with pesticides spaying is very common elsewhere. Thus, it occurs in "neighboring farms of soybean and corn transgenic varieties producers in Santa Catarina and Paraná, as well as countries such as Australia and the United States," said Ricardo Felicetti of the Rio Grande do Sul Department of Agriculture. In addition, pesticide drift affects other crops than grapevine, such as of olive, apple, plum, cassava, watermelon, peach, and vegetables, as well as native plants nearby. Although many factors can affect the distance of the drift, some pesticide active ingredients have inherent physio-chemical properties to be very tiny; and then, it goes further away than others. This is the case of 2,4-D, among others.

Organic producers are also victims because organic farms are also reached by the pesticide drift. There is much evidence from distinct sources: Governmental inspection, farmers' complaints, press news, and lawsuits. Since organic farmers are spread in the country, they can be affected not only in the region of Campanha Gaúcha, but in the entire area where high drift potential pesticides are spread, particularly, nearby where herbicide resistant transgenic varieties are cultivates. In fact, the National Network of Lawyers and Popular Lawyers (Renap) started to complain and the liability and redress of the losses also in organic production is underway. Intriguingly, physicians and nutritionists recommend the use of fresh fruits and vegetables in the human diet, to contribute the human health, they ca be also contaminated by pesticide drift.

[25] Karen Viscardi, "Casos de deriva do agrotóxico 2,4-D dobram em um ano no RS, com 140 laudos comprovados em 2019". GZH, https://gauchazh.clicrbs.com.br/colunistas/gisele-loeblein/noticia/2020/01/casos-de-deriva-do-agrotoxico-24-d-dobram-em-um-ano-no-rs-com-140-laudos-comprovados-em-2019-ck5rbbc7d0arq01mvlv7a2hd0.html (Accessed April 27, 2022).
[26] Projeto Colabora. Agrotóxico 2,4-D mutila e mata em vinhedos do sul. https://projetocolabora.com.br/ods15/agrotoxico-24-d-mutila-e-mata-em-vinhedos-no-sul/ (Accessed April 2, 2022).

In conclusion, due to the losses and the underway lawsuits, the community cohesion has been broken apart: viticulturists increased cohesion and associativism among themselves, but social cohesion between them and soybean growers no longer exist in several areas of Rio Grande do Sul state and the same started or will happen in other states. More importantly, viticulturists from Campanha region no longer can forecast if they will harvest good and reasonable number of grapes if transgenic soybean continues to be grown nearby. Organic farmers are another group of farmers that initiated a dispute because they production are being contaminated by pesticides drift.

The clashes in the countryside, historically associated with environmental preservation and the struggle for land, have gained new contours in Rio Grande do Sul. This time, the duel is not between environmentalists and farmers or landless and farmers. The conflict takes place between gates – with producers on opposite sides. However, nowadays, some of the adverse consequences of transgenic varieties forecast by environmentalist are in fact on place: increased use of pesticides, food contamination, damage to neighborhood production, damage to biodiversity, and breakdown the social cohesion, among others.

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