

Meteorological Behavior and its Influence on the 2002 Vintage in Serra Gaucha

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The meteorological conditions have great influence on the grapevine behavior and directly interfere in the production and quality of the grapes from Serra Gaucha.

The periods of sprouting, flowering, fructification, ripening, leaf fall and vegetative dormancy need a suitable amount of light, water and heat so that the grapevine can develop and produce grapes with quality.

The meteorological conditions that influenced the 2002 vintage (Figures 1 and 2) showed the following behavior, according to the main phenological stages of the grapevine:

a) Vegetative dormancy – the grapevine, during fall and winter, begins its dormant period due to the decrease in the temperature. The low temperatures that occur in the end of May until the end of August are fundamental for the grapevine, because the colder this subperiod is, the better the dormancy will be and the better the conditions for the sprouting of the grapevine will be. During the winter of 2001, there were six frosts and the number of hours when the temperature was below 10^o C totaled 720 hours. This figure was 302 hours lower than average of the years 1976/2000. Temperatures in August 2001 averaged above the climatological normal for Serra Gaucha. Although it featured fewer hours of cold than the average, the grapevine sprouting was appropriate.

b) Sprouting – the grapevines start to sprout at the end of winter and beginning of spring, as the temperature rises. September 2001 was characterized by minimum and average temperatures above the climatological normal. Due to the higher temperature in August the sprouting period was anticipated in one week, in comparison with the normal condition of sprouting for Serra Gaucha. The rainfall was a little higher than the climatological normal 1961/90. Temperatures in October were higher and the precipitation was similar to the climatological normal. These meteorological

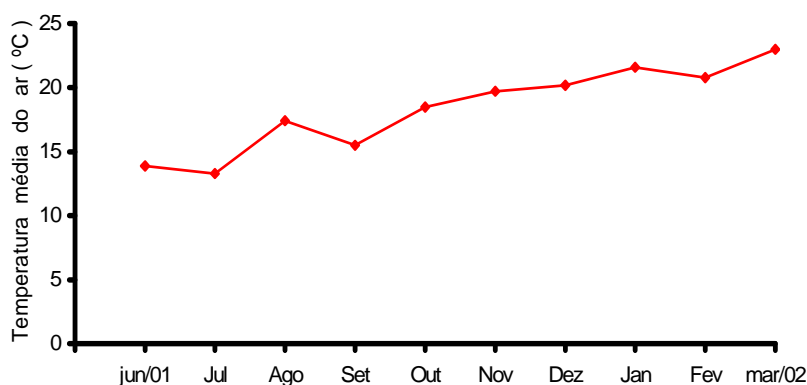
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features provided conditions for suitable sprouting and the development of the grapevine buds, both for early and late sprouting cultivars.

c) Flowering-Fructification – this subperiod is one of the most critical for the grapevine because it determines, in great part, the quantity of grapes to be harvested during the vintage. For the adequate development of the flowering and fructification, it is necessary dry and sunny weather, with temperatures above 18^oC. The flowering period was normal in the region of Serra Gaucha. For most of the cultivars, it started in the second half of October and continued until the middle of November, for the late cultivars. November had temperatures and precipitation above the climatological normal. Because of these climatic conditions the sprouting-flowering subperiod had few diseases caused by fungus and which were easily controlled by the winegrowers.

d) Ripening-Harvest – this is another critical subperiod, as it defines the quality of the vintage. During the ripening subperiod, sunny days with reduced precipitation are fundamental to obtain healthy grapes with balanced rate of sugar/acidity, essential characteristics in order for the enologist to produce good wines. The rainfall and the insolation in the cities of Garibaldi, Bento Gonçalves and Caxias do Sul, from December 2001 to March 2002, which corresponds to the subperiod of the grape ripening in Serra Gaucha are presented in Figure 2. The insolation was lower in Caxias do Sul, mainly in December. The insolation in Garibaldi was similar to one in Bento Gonçalves. The precipitation was similar in the three places, but lower in Garibaldi in January.

Grapes with early ripening, such as Chardonnay, Gewurztraminer and Pinot Noir, started to be



harvested in the first half of January 2002, and the harvest continued almost until the end of the month. During this subperiod the insolation was higher and precipitation was lower than the climatological normal, resulting in an evolution of the ripening much above the average condition found in the region.

Grapes with intermediate ripening, such as Riesling Itálico and Merlot, which are harvested from the second half of January through mid-February, had meteorological conditions inferior to the previous ones, as the precipitation was a little higher than the climatological normal. Grapes with late ripening, such as Cabernet Sauvignon and White Muscat which normally ripen in the second half of February through mid-March, had meteorological conditions a little higher than the grapes with

intermediate ripening. Grapes with late ripening experienced precipitation and insolation similar to the climatological normal of the region.

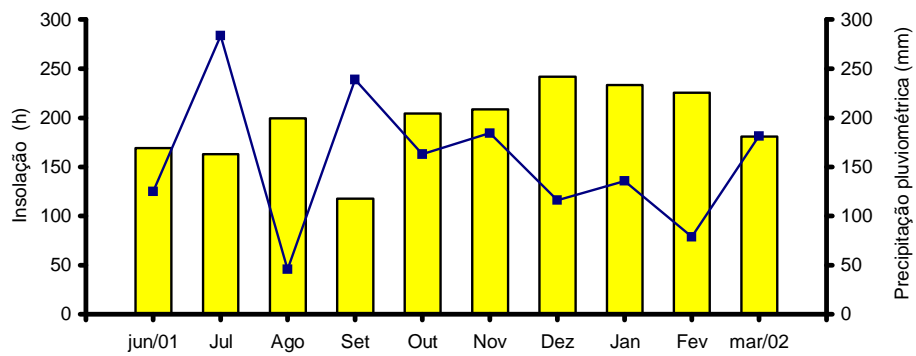
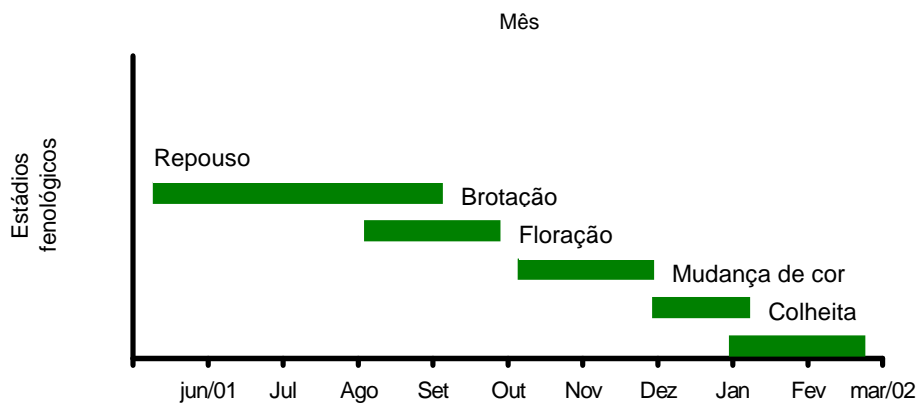


Fig. 1. Meteorological behavior: average air temperature (—), rainfall (—), insolation () and phenolic stages of the grapevine () from June 2001 to March 2002, Bento Gonçalves, RS.
Source: Embrapa Uva e Vinho – Estação Agrometeorológica and Banco de Germoplasma de Uva.



Comparative Analysis of the Vintages

The meteorological conditions to characterize the grape ripening in Rio Grande do Sul were established by Westphalen (1977), through the Ripening Heliopluiometric Index (QM). This index relates the effective accumulated insolation to the rainfall during the grape ripening subperiod (beginning with the change of the berry color through the grape harvest). An index value above 2 was considered ideal by the author, meaning that the higher the QM is, the better the conditions for the grape ripening will be. Table 1 shows the vintage QM from 1993 to 2002, according to the period of the cultivar ripening.

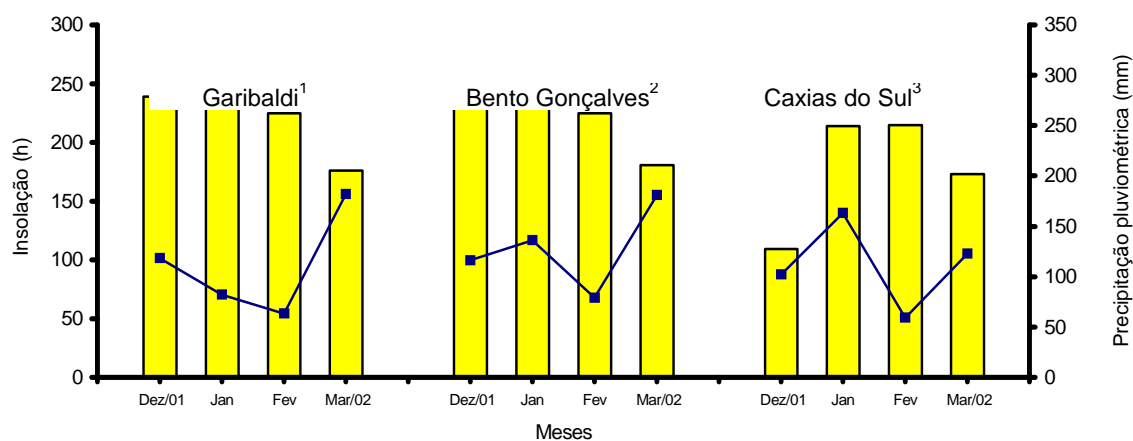


Fig. 2. Rainfall (—) and insolation (▬) that happened during the grape ripening period in the 2002 vintage, in Serra Gaúcha.

Source: Estações agroclimatológicas: ¹Garibaldi – De Lantier Vinhos Finos; ²Bento Gonçalves – Embrapa Uva e Vinho and ³Caxias do Sul – Fepagro – E.E. Caxias do Sul.

Table 1. Ripening Heliopluiometric Index (QM)¹ for different ripening periods. 1993/2002 vintages. Embrapa Uva e Vinho, Bento Gonçalves, RS.

Vintage	Ripening Heliopluiometric Index			
	Ripening period ²			
	Early	Intermediate	Late	Average
1993	1,01	1,22	1,89	1,37
1994	2,85	1,19	1,21	1,75
1995	0,83	1,69	0,89	1,14
1996	1,37	0,36	1,72	1,15
1997	3,42	0,95	1,54	1,97
1998	1,01	0,69	0,82	0,84
1999	3,81	1,80	3,35	2,99
2000	1,63	3,08	1,56	2,09
2001	0,88	1,05	2,88	1,60
2002	3,79	1,44	1,62	2,28

$$^1 \text{QM} = \frac{\text{Total insolation(h)}}{\text{Total precipitation (mm)}}$$

² Early: December 16 to January 15 (Chardonnay, Pinot Noir); Intermediate: January 16 to February 15 (Riesling Italiceo, Merlot); Late: February 16 to March 15 (Cabernet Sauvignon, White Muscat).

Based on the index, the meteorological conditions of the 2002 vintage were excellent for the early grapes and showed above average behavior for the intermediate and late grapes. Although the precipitation was higher for the intermediate grapes in relation to the early ones, grapes with intermediate ripening had a positive influence of the previous period of the early grapes, with low rainfall and very sunny. Late grapes harvested before March 10 presented an index higher than the one in Table 1, as the rainfall increased in the middle of March. The average value of the QM index for the different ripening periods of the 2002 vintage was 2.28. This value corresponds to the two best indexes of the 1993-2002 period.

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