# THE EVOLUTION OF GRAPES RIPENING DURING GROWING SEASON 2021 IN DRĂGĂȘANI VINEYARD

***BOȘTINARU I., BĂDUCĂ CÎMPEANU C., BOTU M.***

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## ABSTRACT

*Harvesting grapes at optimum maturity is an essential condition for obtaining wines of the desired quality. The ripening of the grapes is a dynamic process, that is why the physico-chemical parameters followed for the evaluation of the quantity and quality of the harvest are constantly changing both in terms of their values and the relationships between them. Harvesting grapes at maturity corresponding to the type of wine to be obtained requires rigorous monitoring of the dynamics of maturation. In the Drăgășani vineyard, the local varieties, older or newer, enjoy a special appreciation. In order to be able to highlight its full qualitative potential, harvesting grapes at optimal maturity is the first condition, especially in the wine-growing years characterized by special climatic conditions, such as 2021.*

## INTRODUCTION

Premium wine production can only be made from quality grapes. The determination of harvest date and the assessment of grape maturity need to be as accurate as possible. Therefore, technological and phenolic ripenings are monitored during grape maturation, taking into account environmental factors (Ben Gholzen NaÏma ș.a., 2010). Finding a shared definition of “quality” for wine grapes is still a formidable task simply because quality, being dependent upon individual wine taste, stylistic preferences, vintage variation and a number of other factors, is tremendously subjective. Based on a given final wine target, grape “quality” often reflects quite different “optimal maturity or ripening patterns” and “quality” can exist in every category of wine, from box and jug wines to the very expensive and exclusive premium wines. Thus, optimal grape maturity would correspond to a strikingly different grape composition depending upon the wine styles (e.g. fresh white sparkling vs. aged reds) and its identification in time is the crucial decision. Total soluble solids (TSS) concentration is still the most used parameter to assess ripening and, in several cases, to tag grape prices (Poni S. ș.a., 2018).

The criteria for optimal maturity are multi-faceted. Several important classes of compounds change during ripening and maturation of the fruit on the vine. These characters do not change in a highly coordinated fashion, and instead suggest a series of independently regulated pathways of synthesis. Each pathway is impacted by seasonal factors and vineyard practices, and the effect varies by varietal. Sugar is a component often used to assess ripeness. Sugar content increases during ripening and is therefore a function of berry age. Sugar is also relatively easy to assess, adding to its value as an index of ripeness (Bisson Linda, 2001).

Variability in the ripening and maturation of fruit impacts its composition and ultimate quality (Pagay V., Cheng Lailiang, 2010). A complete understanding of the grapevine-climate relation is difficult to achieve and remains a challenge for researchers seeking to describe the diversity of the «terroir» and define its influence on the grape composition (Falcão Leila Denise ș.a., 2010). Increasing maturity had consistent effects on berry weight across vintages and on berry phenolic composition within vintages. In a commercial context, peak total anthocyanin concentration and content might be a useful guide to harvest decisions (Holt Helen ș.a., 2010).

Ripeness uniformity and berry size are thought to be key determinants of fruit quality, and hence crop price, for winemaking, but there is little objective data to confirm the relationship between both variables and crop price (Calderon-Orellana A. ș.a., 2014). Final

berry mass, a major quality factor in wine production, is determined by the integrated effect of biotic and abiotic factors that can also influence berry composition. Under field conditions, interactions between these factors complicate study of the variability of berry mass and composition. Depending on the observation scale, the hierarchy of the impact degree of these factors can vary (Triolo Roberta ș.a., 2018). Formal or informal sensory analyses of grapes are often used to determine when a parcel of fruit should be harvested to produce a certain wine style (Niimi J. ș.a., 2018).

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## MATERIAL AND METHOD

In the growing season 2021 we studied 5 indigenous varieties grown in the Drăgășani vineyard, these being 3 varieties for white wines (Crâmpoșie selecționată, Fetească albă and Tămâioasă românească) and two varieties for red wines (Novac and Negru de Drăgășani). While Fetească albă and Tămâioasă românească varieties are old Romanian varieties, long cultivated in many vineyards in our country, the Crâmpoșie selecționată, Novac and Negru de Drăgășani are varieties that have appeared in recent decades, being obtained in Drăgășani vineyard. Therefore, these varieties are well adapted to the natural climate and soil conditions characteristic of the Drăgășani vineyard, being important varieties in the current assortment of the vineyard.

The 5 varieties are located in the same viticultural area, come from plantations of the same age (10 years), with planting distances of 2.2 / 1 m and the same pruning system – Guyot.

For all varieties, the dynamics of ripening by sampling berrys from 20 bunches located on 20 vines, spread evenly in the plantation to be representative, was followed. Samples were taken at regular intervals (1 week), from August 2 to September 20. At each sampling, 3 indicators of grape ripening were determined: mass of 100 berries and grape content in sugar (g/L) using a digital refractometer and total acidity (g/L tartaric acid) by titration with NaOH.

## RESULTS AND DISCUSSIONS

The dynamics of grape ripening from the 5 studied varieties shows similar evolutions of the observed parameters but there are differences between varieties in terms of the values of these parameters. Thus, throughout the ripening of the grapes, the sugar content continuously increased (figure 1), while the total acidity decreased (figure 2). Instead, the berries mass increased to a maximum after which it began to decrease (Figure 3).

At the beginning of the grape ripening monitoring period, all 5 varieties had sugar contents between 102 and 118 g/L, the lowest content being at the Crâmpoșie selecționată and the highest at Tămâioasă românească. Fetească albă had 110 g/L, Negru de Drăgășani had 105 g/L and Novac 104 g/L.

At the end of the monitoring period of grape ripening dynamics, the sugar content was between 205 and 234 g/L. The same hierarchy of varieties has been maintained but the differences between them have increased. The highest sugar content was also at Tămâioasă românească, followed by Fetească albă (230 g/L), and the lowest was at Crâmpoșie selected. Negru de Drăgășani had 225 g/L and Novac 214 g/L. So, the difference between the two red varieties was 1 g/L at the beginning of ripening and 11 g/L at the last sampling.

The highest increase in sugar content was 120 g/L in the varieties Fetească albă (from 110 to 230 g/L) and Negru de Drăgășani (from 105 to 225 g/L). In Tămâioasă românească the increase was 116 g/L (from 118 to 234 g/L), in Negru de Drăgășani it was

110 g/L (from 104 to 214 g/L), and the lowest increase was at Crâmpoșie selecționată, of only 103 g/L (from 102 to 205 g/L).

The analysis of the total acidity shows a similar evolution in all varieties, characterized by the continuous decrease, throughout the ripening of the grapes. At the time of the first sampling, the highest total acidity was for the Crâmpoșie selecționată and Novac grapes, both varieties having over 10 g/L tartaric acid. The lowest total acidity was Fetească albă (9.1 g/L tartaric acid). At the date of the last sampling, in all varieties the total acidity was much diminished, only the Crâmpoșie selecționată had acidity over 5 g/L L. The lowest total acidity was also in Fetească albă (4.0 g/L tartaric acid).

The mass of 100 berries is the parameter that showed the most different evolutions. In all varieties, the berries size increased to a maximum level after which it began to decrease but the maximum level was not reached at the same time. Thus, at the selected Crâmpoșie the maximum level was 113 g and was reached at the penultimate sampling (September 13). At Tămâioasă românească, the maximum level was 120 g and it was reached a week earlier (September 6). In Fetească albă, the maximum level was reached at the earliest (August 30) and was 108 g, the smallest of the varieties.

After reaching the maximum level, a decrease of the values of this parameter in all varieties followed. The time when the varieties have reached the maximum value for the mass of 100 berries is considered the stage of full maturity. The decrease in berries mass occurs during grape overripeness.

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*Table 1*

**Evolution of 100 berries mass during grapes ripening (g)**

| Variety | August, 2 | August, 9 | August, 16 | August, 23 | August, 30 | Sept. 6 | Sept. 13 | Sept. 20 |
|---|---|---|---|---|---|---|---|---|
| Crâmpoșie selecționată | 64 | 78 | 95 | 104 | 110 | 112 | 113 | 110 |
| Fetească albă | 68 | 80 | 98 | 110 | 118 | 120 | 118 | 115 |
| Tămâioasă românească | 62 | 75 | 90 | 102 | 110 | 108 | 106 | 104 |
| Novac | 75 | 94 | 114 | 122 | 126 | 125 | 123 | 121 |
| Negru de Drăgășani | 78 | 90 | 110 | 125 | 128 | 130 | 130 | 127 |

*Table 2*

**Evolution of sugar content during grapes ripening (g/L)**

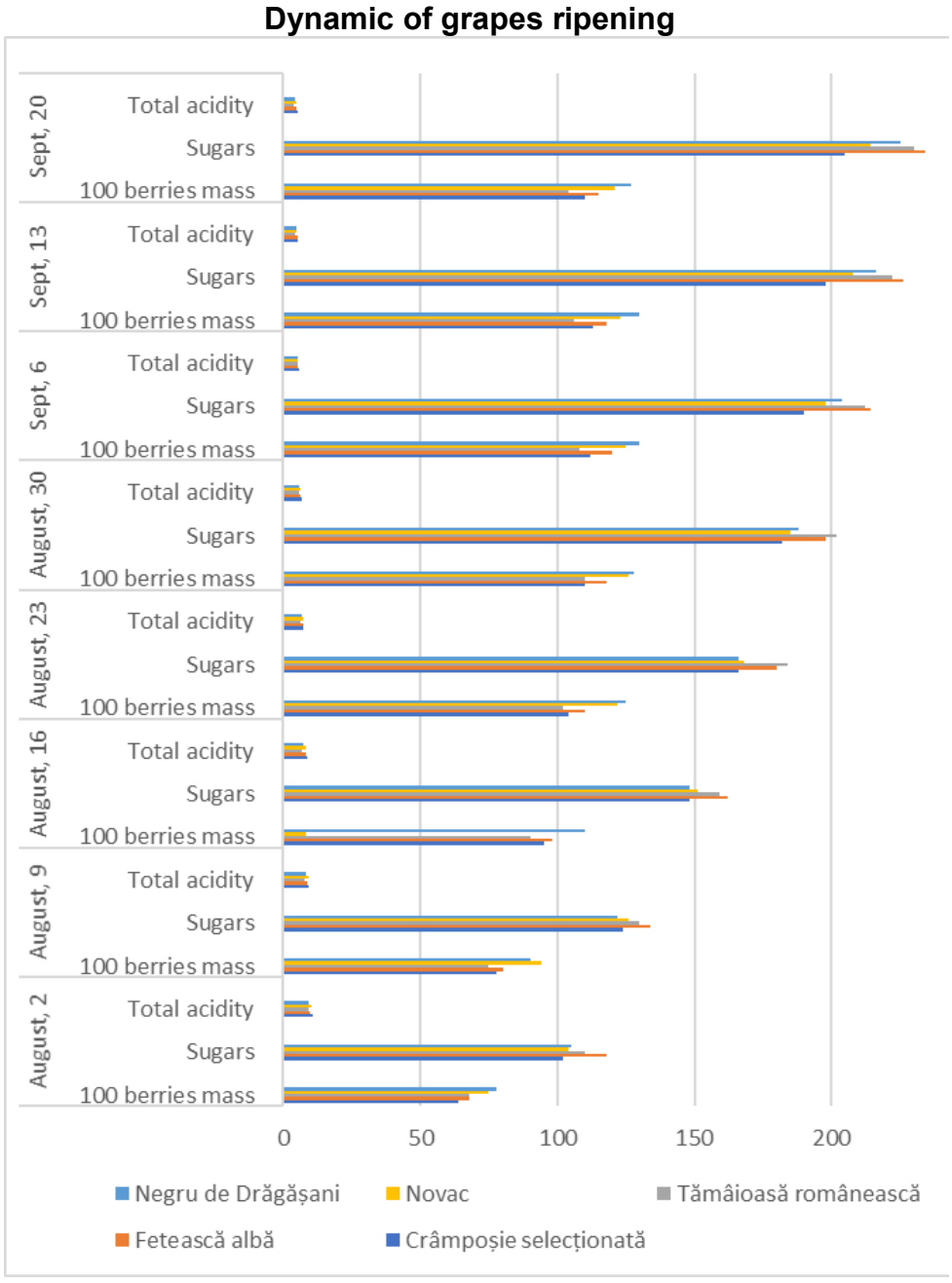
| Variety | August, 2 | August, 9 | August, 16 | August, 23 | August, 30 | Sept. 6 | Sept. 13 | Sept. 20 |
|---|---|---|---|---|---|---|---|---|
| Crâmpoșie selecționată | 102 | 124 | 148 | 166 | 182 | 190 | 198 | 205 |
| Fetească albă | 118 | 134 | 162 | 180 | 198 | 214 | 226 | 234 |
| Tămâioasă românească | 110 | 130 | 159 | 184 | 202 | 212 | 222 | 230 |
| Novac | 104 | 126 | 151 | 168 | 185 | 198 | 208 | 214 |
| Negru de Drăgășani | 105 | 122 | 148 | 166 | 188 | 204 | 216 | 225 |

*Table 3*

**Evolution of total acidity during grapes ripening (g/L tartaric acid)**

| Variety | August, 2 | August, 9 | August, 16 | August, 23 | August, 30 | Sept. 6 | Sept. 13 | Sept. 20 |
|---|---|---|---|---|---|---|---|---|
| Crâmpoșie selecționată | 10.6 | 9.5 | 8.8 | 7.5 | 6.6 | 5.8 | 5.4 | 5.2 |
| Fetească albă | 9.8 | 8.8 | 8.1 | 7.2 | 6.4 | 5.5 | 5.1 | 4.8 |
| Tămâioasă românească | 9.1 | 7.8 | 7.0 | 6.1 | 5.6 | 5.1 | 4.5 | 4.0 |
| Novac | 10.2 | 9.3 | 8.1 | 7.5 | 6.2 | 5.4 | 5.0 | 4.6 |
| Negru de Drăgășani | 9.5 | 8.5 | 7.4 | 6.6 | 6.0 | 5.2 | 4.8 | 4.4 |

*Figure 1*


Dynamic of grapes ripening
Sept, 20
Sept, 13
Sept, 6
August, 30
August, 23
August, 16
August, 9
August, 2
Total acidity
Sugars
100 berries mass
0
50
100
150
200
Negru de Drăgășani
Novac
Tămâioasă românească
Fetească albă
Crâmpoșie selecționată