

## RESEARCH ON THE PHENOLOGY OF THE VARIETIES CULTIVATED IN ECOLOGICAL AND CONVENTIONAL SYSTEM IN THE GROWING SEASONS 2018 IN THE MURFATLAR VITICULTURAL AREA

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### ABSTRACT

*The study carried out in the vintage 2018 in the Murfatlar winegrowing area included 6 varieties and two culture systems: conventional and ecological. The evolution of the phenological stages in the 6 varieties showed that the duration of the growing season, from the budburst to the fall of the leaves was between 196 and 205 days, depending on the variety. The conventional or ecological culture system had no influence on the duration of the phenological stages.*

### INTRODUCTION

Climate is a major factor driving the spatio-temporal distribution of most agricultural systems, due to their vulnerability to inter-annual climate variability and to climate change (Gouveia C. e.a., 2011). Climate variation contributes to fluctuations in reproductive output, and spring temperature is thought to influence flower production in grapevines. The reduction in the susceptibility of grape berries to splitting is attributed to a decrease in turgor-generating capacity within the berry as an increasing proportion of pericarp cells lose vitality. The loss of cell vitality corroborates previous evidence of this phenomenon, and indicates that this is a general feature of grape ripening (Keller M. e.a., 2010). The strong link between climate and grapevine phenology suggests a potentially stronger impact of climate change on viticulture in climate-limited areas, including mountain zones (Caffarra A., Eccel E., 2011). One of several challenges in cool climate viticulture with a short growing season is to consistently reach a uniform, optimal fruit technological maturity at harvest before the first autumn frost (Frioni, T. e.a., 2017).

Three main phenological stages can be used to describe the grapevine developmental cycle: budbreak, flowering and véraison. Budbreak is the onset of

vegetative growth, flowering is the time when the fertilisation process leads to the formation of berries and véraison is the beginning of the ripening process, which ends at harvest when sugar content and acidity meet required levels. At véraison, berries undergo major changes, i.e. cell wall degradation, skin colouration, sugar accumulation and malic acid degradation. 'Maturity' is not a phenological stage due to the difficulty in establishing uniform criteria for different varieties (Duchêne E. e.a., 2010). The shift in phenological development is the most conspicuous biological effect of climate change in vineyards worldwide. Associated with the advancement in maturity there has been a compression of the harvest period that places significant pressure on vineyard and winery infrastructure (Petrie P.R. e.a., 2017). Predicting phenological stages through modeling has significant implications for planning viticultural practices and for predicting the impact of climate change on phenology. The Chill Overlap Model is based on an exponentially declining curve that integrates the demonstrated compensatory relationship between chill and heat accumulation. It also incorporates recent research-based knowledge of physiological changes during dormancy (Prats-Llinàs Maria Teresa e.a., 2019). Excessive vine

vegetative growth in wet, cool climates increases management costs and compromises grape quality. The standard practice of bare soil under vines

## MATERIAL AND METHOD

We followed the phenological stages in 6 varieties grown in the Murfatlar vine-growing area during growing season 2018. Along with the varieties Mamaia (red) and Columna (white), we studied two other native varieties (Fetească regală and Băbească neagră) and two international varieties (Sauvignon and Merlot), grown in both ecological and conventional systems. For each variety, we followed all the phenological stages, from crying to falling leaves and calculating the length of the growing season from the budburst to the full maturity and to the fall of the leaves.

## RESULTS AND DISCUSSIONS

The analysis of the phenological data shows the same timing of the phenological stages in the first part of the growing season in both crop systems. The only phenological stage reported at the same time for all varieties and both crop systems is leaf fall.

The first phenological stage, the budburst, took place between April 18 and 27, with the Feteasca regală variety the earliest and Merlot the last one that came out of the dormans. In the Columna variety, the budburst was registered on April 22, 3 days before the Mamaia variety.

The next phenological stage was the blooming, which ran from May 24 to May 30. In the Columna and Mamaia varieties, the flowering was recorded on the same date (May 28), even though the budburst was on different dates. Thus, in the Columna variety, the duration from budburst to flowering was 36 days, as in the Sauvignon variety, while in the Mamaia variety it was 33 days, as in the Sauvignon variety.

exacerbates the vigor problem (Chou M.-Y., Vanden Heuvel Justine, 2019).

The next phenological stage (veraison) was performed for a shorter period than the first two, between 4 and 8 August. The first varieties that reached the veraison were Mamaia and Feteasca regală but while in the Mamaia variety the duration from flowering to the veraison was 68 days, in the Feteasca regală variety it was 72 days. The variety that came to the cradle later was Băbească neagră, after 70 days of flowering. The longest variety from flowering to veraison was Sauvignon (72 days). Column variety reached the veraison on August 5, 69 days after flowering.

If from budburst to veraison the phenological stages have been progressively shorter, the moment of full maturity has varied greatly from one variety to another, this phenological stage being recorded between 10 and 27 September. The first varieties that reached full maturity were Băbească neagră (September 10) and Fetească regală (September 13) while Merlot arrived at the latest (September 27). Mamaia variety reached rather late to full maturity (September 25th), although it reached the first one in veraison, having the longest interval from veraison to full maturity (52 days). Column variety reached full maturity on September 19, 45 days after the veraison. The shortest duration from veraison to full maturity was at the Băbească neagră variety (33 days), followed by the Sauvignon variety (38 days).

The harvesting of grapes at commercial maturity was made between September 13 and 30, at intervals that varied between 1 day and 15 days after full maturity. All varieties were harvested at the same time for both crop systems except the Sauvignon variety, which was harvested on September 14 (1 day after full maturity) in the conventional crop system and on September 28 (15 days after full maturity) in the ecological

system of culture. Also on September 14th and also one day after full maturity, the Feteasca regală variety was harvested while the last variety was Merlot (September 30th, 3 days after full maturity).

Regarding the duration of the growing season, we found that the Băbească neagră variety had the shortest duration from budburst to full maturity (138 days), followed by Sauvignon (145 days), Fetească regală (148 days), Column (150 days), Mamaia and Merlot (153 days).

The duration from budburst to leaf fall was longer, comprising 196 days (Merlot variety) and 205 days (Fetească regală variety). In the Mamaia variety, the duration from decay to leaf loss was 198 days, with the shortest duration from full maturity to leaf fall (45 days).

### CONCLUSIONS

The phenological stages of the 6 varieties studied in the vintage 2018 in the Murfatlar vinegrowing area, from the budburst until the fall of the leaves took place between April 18 and November 9, the duration of the growing season being between 196 and 205 days. For each variety all phenological stages were carried out at the same time in both the conventional and the ecological system of culture.

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Table 1

The phenological stages

Cultivar	Calendar data						Duration of the growing season Number of days	
	Bud.	Bloom.	Ver.	Full m.	Harvest	Fall of the leaves	Bud. - Full maturity	Bud. - Fall of the leaves
<b>Columna conventional</b>	22.04	28.05	05.08	19.09	27.09	09.11	150	201
<b>Columna ecological</b>	22.04	28.05	05.08	19.09	27.09	09.11	150	201
<b>Mamaia conventional</b>	25.04	28.05	04.08	25.09	29.09	09.11	153	198
<b>Mamaia ecological</b>	25.04	28.05	04.08	25.09	29.09	09.11	153	198
<b>Fetească r. conventional</b>	18.04	24.05	04.08	13.09	14.09	09.11	148	205
<b>Fetească r. ecological</b>	18.04	24.05	04.08	13.09	14.09	09.11	148	205
<b>Sauvignon conventional</b>	20.04	26.05	06.08	13.09	14.09	09.11	148	205
<b>Sauvignon ecological</b>	20.04	26.05	06.08	13.09	28.09	09.11	145	200
<b>Băbească n. conventional</b>	25.04	30.05	08.08	10.09	18.09	09.11	138	198
<b>Băbească n. ecological</b>	25.04	30.05	08.08	10.09	18.09	09.11	138	198
<b>Merlot conventional</b>	27.04	30.05	06.08	27.09	30.09	09.11	153	196
<b>Merlot ecological</b>	27.04	30.05	06.08	27.09	30.09	09.11	153	196

Bud. - Budburst; Bloom. - Blooming; Ver. - veraison; Full m. – Full maturity; Băbească n. – Băbească neagră; Fetească r. – Fetească regală