

EVOLUTION OF PRINCIPAL PHENOLOGICAL PHASES OF SOME OLD AUTOCHTHONOUS VARIETIES IN CONDITIONS OF AMPELOGRAPHIC COLLECTION OF ISPHTA

EVOLUȚIA PRINCIPALELOR FAZE DE VEGETAȚIE LA UNELE SOIURI VECHI AUTOHTONE ÎN CONDIȚIILE COLECȚIEI AMPELOGRAFICE A ISPHTA

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Abstract. *In the paper is presented the evolution during the last 50 years of the principal phenological phases of some old autochthonous varieties in the conditions of the Ampelographic Collection of the Scientific and Practical Institute of Horticulture and Food Technologies of the Republic of Moldova, in the context of evolution during this period of climatic parameters. The observations covered three distinct periods: 1962-1968, 1978-1987 and 2012-2014. For most varieties, during the last study period, there is a pronounced trend of earlier development of all phenological phases. The analysis of the qualitative parameters indicates a decrease, compared to the previous periods, of the total acidity of must.*

Key words: grapevine, Ampelographic Collection, old autochthonous varieties, phenological phases

Rezumat. *În lucrare sunt prezentate date preliminare privind evoluția pe parcursul ultimilor 50 de ani a principalelor faze fenologice la unele soiurile vechi autohtone în condițiile Colecției Ampelografice a Institutului Științifico-Practic de Horticultură și Tehnologii Alimentare din Republica Moldova, în contextul evoluției în această perioadă a parametrilor climatici. Observațiile au cuprins trei perioade distincte: anii 1962-1968, 1978-1987 și 2012-2014. Pentru majoritatea soiurilor, pe parcursul ultimei perioade de studiu, se constată o tendință pronunțată de desfășurare mai timpurie a tuturor fazelor fenologice. Analiza parametrilor calitativi denotă o scădere, în comparație cu perioadele precedente, a conținutului mustului în aciditate.*

Cuvinte cheie: vița de vie, colecție ampelografică, soiuri vechi autohtone, faze fenologice

INTRODUCTION

The old autochthonous grapevine varieties represent an important component of the assortment, and some of them have shown over the years an increased or advanced adaptability to the local pedo-climatic conditions. At the

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present time, as during the invasion of phylloxera and pathogens in Europe, world viticulture is facing a new challenge – the phenomena of Climate Change, that influence the main ecological factors on which depends the development of viticulture (Jones and Davis, 2000), and confirmed by some researches concerning the old autochthonous varieties (Donici *et al.*, 2007; Rotaru and Colibaba, 2011; Bucur and Dejeu, 2014).

The presence of a multi-year study, over various periods of time, of the old autochthonous varieties within the Ampelographic Collection (Ivanova, 1976; Savin, 1981), as well as the data accumulated more recently, within the international project COST FA 1003 (<https://www.cost.eu/actions/FA1003/>; Rustioni *et al.* 2014), allow to carry out a first evaluation of the evolution of the behavior of this group of varieties under the conditions of the wine-growing region “Centru” of the Republic of Moldova.

MATERIAL AND METHOD

The studies have been carried out on old autochthonous varieties during three distinct periods: I - 1962-1968, II - 1978-1987 and III - 2012-2014 within the Ampelographic Collection of the Research and Practical Institute for Horticulture and Food Technologies (the former Moldavian Institute for Horticulture, Viticulture and Oenology, and later National Institute for Viticulture and Oenology), located in the southern part of Chisinau city, Republic of Moldova (46°58'39.65" N și 28°46'21.68" E, altitude 201 m). Phenological data for periods I and II were collected from the Archive of Department of Grapevine Breeding and Genetic Resources, including studies and descriptions performed in so called Old Ampelographic Collection (founded in 1956). In period 2012-2014 the studies were performed within the New Ampelographic Collection (founded in 1984) in the frame of international COST project FA1003 “East-West Collaboration for Grapevine Diversity Exploration and Mobilization of Adaptive Traits for Breeding”. Geographical locations of both Collections are similar (coordinates and elevation), but slightly differs the exposition of terrain. The weather conditions of the experimental sectors correspond to the conditions of the wine region Codru of the Republic of Moldova and represent the average values for the republic.

For collection of data in periods I and II was applied methodology accepted for evaluation of genetic resources in Ampelographic Collection (Ivanova, 1973) and in third period was used Phenotyping Protocol accepted in the frame of project COST FA1003 (Rustioni *et al.*, 2014).

In order to compare dates of main phenological phases, calendar date was calculated as number of days from January, 1. The phenological data obtained in period III (2012-2014) were compared with the corresponding data obtained in periods I and II. For establishment of significance of differences between observed dates was used t-Test for Two-Sample, presented in Data Analysis module of MS Excel.

RESULTS AND DISCUSSIONS

For the study periods I and II, the data were taken from the passports of the varieties, completed following the observations made in the old Ampelographic Collection. Depending on the variety and the number of accessions present in the Collection, samples including 10-25 values were formed. Initial data were entered

into the Database, systematized and pre-processed. Along with the data obtained in the last period (III), the average values for the date of the main phenological phases (expressed by the number of days since January 1) and the must content in sugar and acidity were calculated (tab. 1).

The observed general trend – a shortening of the period of the main phenological phases in the last period of time (period III - years 2012-2014), compared to the first two periods. At the same time, in the II study period (1978-1987) a later date of the initial phenological phases (bud burst, full bloom and beginning of ripening) is attested, compared to the I study period (1962-1968), a fact that does not manifest itself for the maturation phase the grapes. Analyzing the data regarding the evaluation of solar climate resources on the territory of the Republic of Moldova (**, 2020), we find the coincidence of this time interval with a period of decrease in global and direct solar radiation, during which a local minimum is set. Since the 90s of the century XX, the phase of increase in the values of direct solar radiation is attested, reflected in the phenological dates for the last period.

Analyzing the differences between the starting dates of the main phenological phases in the three time periods, even if a decrease is established in the last period studied, not in all cases the difference is statistically significant. Thus, we observed a shift towards an earlier bud burst (confirmed from a statistical point of view) in the table varieties Coarnă albă and Tâta caprii (tab. 1, fig. 1). For all the varieties in this group, a significant decrease in the date of the ripening and maturity of the grapes is observed. For the content of must in sugars, no strict legality was observed in the variation of values - depending on the variety, values similar to those of period I and/or II are found. In all cases, a significant decrease in the must content in titratable acidity is found.

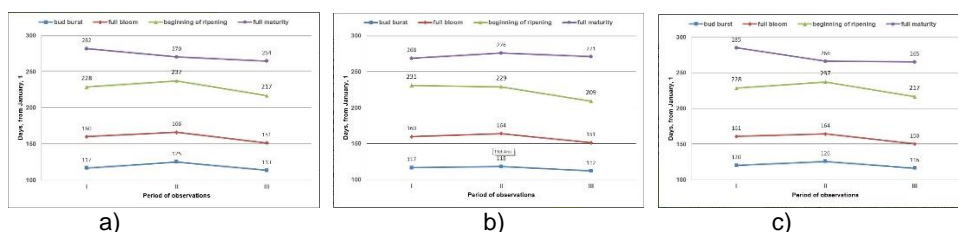


Fig. 1. Evolution of the main phenological phases principal for varieties for table grapes:
a) Coarnă albă, b) Coarnă neagră, c) Tâta căpriei

In the group of varieties for wine, a significantly earlier bud burst compared to the previous periods, have approx. half of the number of varieties studied (for example: Bășicata de Dealul Mare, Cabasmă albă, Crâmpoșie, Francușe etc.).

A more pronounced decrease, for most varieties for wine, of the early date of the phenological phases is found for the grapes ripening and maturity phases. At the same time, we mention the presence of a number of varieties, which showed a greater sensitivity to the decrease in the date of the development of all

Table 1

Evolution of main phenological phases of old autochthonous varieties (fragment)
(Ampelographic Collection of ISPHTA, average for periods:
I - 1962-1968, II - 1978-1987, III-2012-2014)

Variety name	Periods of observations	Main phenological phases, days from January, 1				Content of must in:	
		bud burst	full bloom	beginning of ripening	full maturity	sugar, °Brix	titratable acidity, g/dm ³
Grapes for table							
Coarnă alba B	I	117	160	228	282	20.6	7.1
	II	125	166	237	270*	15.9*	8.2
	III	113*	151	217*	264*	20.6	4.8*
Coarnă neagră N	I	117	160	231	268	19.5	7.5
	II	118	164	229	276	17.0*	-
	III	112	151*	209*	271	16.9*	4.7
Damașin galben B	I	117	161	221	277	18.5	10.1
	II	121	162	223	279	17.9	10.2
	III	115	153	207*	259*	16.6	6.0*
Tâta căprii B	I	120	161	233	285	17.7	8.9
	II	126	164	240	266	18.6	10.8
	III	116*	150*	219*	265*	18.0	5.8*
Grapes for wine							
Băbească neagră N	I	118	158	229	280	21.6	11.9
	II	121	162	235	280	19.2	11.4
	III	115	149*	205*	256*	22.0	8.2*
Bășicata de Dealul Mare B	I	123	163	233	285	15.6	10.4
	II	127	166	233	279	14.4	10.5
	III	115*	156*	232	267*	13.2*	9.4
Brează N	I	121	162	233	285	19.5	9.1
	II	122	161	234	276	18.3	10.0
	III	114	151*	215*	265*	17.6	7.0
Cabasmă alba B	I	121	160	226	274	19.5	9.7
	II	126	165	232	274	18.6	8.7
	III	115*	153*	217*	266	18.6	6.4*
Ciorcuța neagră N	I	121	161	232	278	19.3	7.5
	II	127	165	234	274	19.1	9.7
	III	115*	150*	216	270*	18.5	6.0*
Ciorcuța roză N	I	120	160	229	289	18.7	8.3
	II	124	165	237	274	18.8	8.0
	III	113*	158	214*	267*	21.0	3.9*
Copceac N	I	116	160	223	278	22.3	7.8
	II	121	160	222	271	19.7	11.3*
	III	114	154	203*	256*	23.4	6.3
Crâmpoșie B	I	121	162	224	284	18.3	11.0
	II	124	165	229	274*	17.0	9.2
	III	113*	150*	213	269*	18.0	6.1*

Note: * - statistically, the value differs significantly (significance level $\alpha=0.05$)

Variety name	Periods of observations	Main phenological phases, days from January, 1				Content of must in:	
		bud burst	full bloom	beginning of ripening	full maturity	sugar, °Brix	titratable acidity, g/dm ³
Fetească alba B	I	121	156	231	278	21.7	9.3
	II	119	160	227	269*	18.9	10.2
	III	112	148*	203*	261*	21.2*	5.0*
Francușe B	I	120	160	220	279	19.3	8.6
	II	123	165	229*	271*	19.5	8.6
	III	113*	153	201*	264*	22.9	7.3
Galbenă de Ardeal B	I	121	157	225	289	21.9	11.2
	II	123	162	233	282	21.4	10.4
	III	115	152	-	264	21.0*	6.0
Galbenă de Odobești B	I	121	160	226	269	17.9	7.4
	II	124	164	233	272	17.5	9.1
	III	114	150*	215*	260	19.1	6.9
Gordin B	I	116	160	223	287	19.5	9.1
	II	124*	164	231	272*	16.1*	10.0
	III	115	150	214*	260*	17.2	7.7
Grasă de Cotnari B	I	120	158	219	286	18.0	9.8
	II	124	165	228	266*	23.2*	12.6
	III	114*	154	201*	264*	16.4	7.6
Maischii ciornii N	I	118	161	228	281	17.7*	8.6
	II	118	158	223	278	19.5	9.5
	III	113	153	209*	261*	19.1	5.8*
Negru de Akerman N	I	119	165	225*	281	17.3	8.9
	II	124	167	236*	284	16.5	9.1
	III	112*	155*	213*	263*	18.6	6.0*
Negru de Căușeni N	I	119	160	226	263	19.4	13.2
	II	124	165	236	283	19.1	11.9
	III	113*	152*	-	261	16.3	8.1*
Plăvaie B	I	120	157	225	284	18.9	7.4
	II	118	157	223	279	17.6	9.8*
	III	113	150	213	264*	18.3	5.9
Seina N	I	118	161	236	283	19.7	7.5*
	II	125	166	241	274	18.0	9.7*
	III	113*	151*	215*	268*	19.6	5.4*
Zemoasă B	I	120	161	215	285	17.5	11.9
	II	120	160	225	273*	19.1	9.6
	III	112	155	220	252*	18.1	6.6*
Zghihară B	I	120	156	226	280	19.0	9.3
	II	124	164	231	283	16.2	9.4
	III	113*	148*	211*	268*	17.9	6.4

phenological phases: Crâmpoșie. Grasă de Cotnari. Feteasca albă. Zghihară. Băbeasca neagră. Negru de Akerman. Seina (tab. 1. fig. 2).

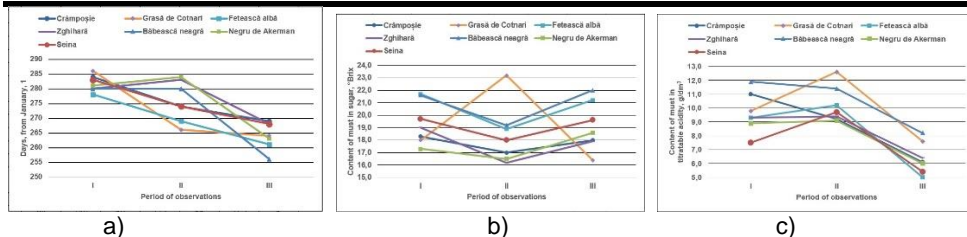


Fig. 2. Evolution of the main phenological phases (a), content of must in sugar (b) and content of must in acidity (c)

As in the case of the varieties for the table, a significant decrease is found, for most varieties, in the content of the must in acidity. Regarding the content of the must in sugar, no strict general law is observed, in the last study period, cases of both increase and decrease of this index were recorded.

CONCLUSIONS

For most varieties, during the last study period (2012-2014), there is a pronounced trend of earlier development of all phenological phases, mainly a statistically significant more early date of the ripening and maturity of the grapes is observed. The analysis of the qualitative parameters indicates a decrease, compared to the previous periods, of the total acidity of must, but for the content of must in sugars, no strict legality was observed in the variation of values.

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