

## RESEARCHES ON THE FERTILITY AND PRODUCTIVITY RESPECTIVE POTENTIAL DEGREES HELD BY THE OFFSHOOTS ISSUED FROM CERTAIN VINE KINDS FOR TABLE GRAPES CULTIVATED IN THE DEALUL OLT - DRĂGĂȘANI VINEYARD

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### Abstract

*The local climate's potentialities from which the Drăgășani vineyard does effectively benefit do allow the vine plants not just to realize within their grapes the respective synthesis processes of whatever among their finally obtained chemical constituents no matter how complex their structures could be but furthermore to achieve them under some quite large quantitative ratios. Yet this genuine natural abundance of climate potentialities is accompanied by no climate roughnesses at all which could concomitantly have caused to the grapes whatever losses and alterations that might subsequently have deteriorated their genuinely established intrinsic constitutive harmony. The statistical data respectively gathered in regard to the fertility degrees, the productive ratio of their offshoots as well as the quantities and qualities of their grapes' harvests for some vine kinds cultivated in the Drăgășani zone which do produce table grapes such as: Coarnă Neagră, Afuz Ali, Victoria or Chasselas Doré do attest the respective facts that the above mentioned vine kinds do provide outputs which simultaneously are economically profitable and qualitatively the best. Insofar the production of sultanas could be concerned the statistical indices which have been recorded in the respective cases of the vine kinds of Sultanină and Călina (which is a created hybrid between the kinds of Sultanină and Braghină) are attesting the respective achievements of some both quantitatively adequate or either very good harvests and bearing an excellent level of quality.*

**Key words:** vine kind, fertility, productivity, climate

### INTRODUCTION

The vine kinds which are destined to produce table grapes could be cultivated upon an indeed large inventory of soil varieties; in this context we are due to remark the fact that the most outstandingly remarkable through their intrinsic vocation for their respectively achieved oenological high quality levels are the plots which are situated upon the hillock slopes that could be plentifully aerated and prodigally sun-bathed; their autumn seasons ought to be long and dry while their soils themselves ought to be light sandy-clayish ones as well as adequately drained (should that fact occur on their surfaces or either inside

of them). (Fregoni M., et al. 2005; Berbecet et al. 1970; Condei Gh. et al. 1971; Husfeld B. et al. 1970; Martin T. et al. 1977; Popa A. et al. 2019;)

A lot of scientific researches and studies have been carried out in our country concerning the most precise delimiting process of the respective zones where good results could be obtained through the cultivation of vine kinds destined to produce table grapes. Their respective results have pointed out the facts that *the most favoring zone* for the cultivation of table grapes is constituted by the Danube Stream's terraces (Ostrov, Zimnicea, Tr. Severin); *the supportive zone* is situated

within the hillock-shaped meridional zone (Niculițel, Pietroasa, Drăgășani, Craiova, Drăgănești - Olt) as well as within the sandy zone (Calafat, Corabia) while the respective *mean supportiveness zone* and the *tolerant zone* which are both important in respect to the local and Romanian grapes consumption are scientifically established the former around localities such as Odobești, Huși, Iași, Ștefănești - Argeș, Tg. Jiu, Recaș and respectively the latter around the vine cultivated centers from Transylvania, Crișana and Maramureș. (Alexandrescu C.I. et al 1994; Ionică E. et al. 2003; Oșlobeanu M. et al. 1993; Popa A. et al. 2012; Teodorescu Șt et al. 2021; Teodorescu Șt et al. 1981; Fregoni M. et al. 2005; Budan C. et al. 1977)

The convenient financial output of the vine plantations destined to produce table grapes is therefore ensured through the cultivation of the most performing among the concerned vine kinds that is to say of the ones which could provide some quantitatively great grapes'harvests as well as especially great levels held by the respective grapes'commodity production. Because of the fact that at the present moment in Oltenia the land surfaces which do produce table grapes are elevated to a total extent of 368 hectares only while the region's real potential (which by the way had already been attested in the past) is of about 3500 hectares let us then accomplish a scientific study through which we should investigate in order to prove and to attest which might be the Oltenian areas that might be favoring the cultivation of vine kinds which do produce table grapes and which might precisely be the vine kinds that could also bring through their culture an adequate financial profit.

Let us present in the hereby work the results we have come to in the time period

from 2019 until 2020 insofar could be concerned the respective degrees of fertility and productivity achieved by some vine kinds destined to produce table grapes which are currently cultivated within the Dealul Olt - Drăgășani vineyard.

## **MATERIALS AND METHODS**

The National Authority in Meteorology has kindly provided to us the annual and multi-annual statistic and local meteorological data which do concern the main climate's elements which could exert a measurable impact upon the vine plants'growth and fruit-bearing respective processes. These are: - the surrounding air's mean annual values held by temperature; - the total sum of the surrounding air's temperature degrees accumulated throughout the active vegetation time interval (April 1-st until October 31-st); - the annual recorded amounts of precipitations; - the amounts of precipitations recorded each year during the active vegetation period; - the duration of the sun's effective brightness.

We have carried out this important scientific experiment within a vine plantation dedicated to the production of table grapes which is situated in the Dealul Olt vineyard and does administratively pertain to the Research and Development Station for vine Culture and Wine-Making of Drăgășani.

After the vine plants flourishing process had been perfected we have therefore established the respective inventories of the existing number of grapes'clusters, the total number of the existing offshoots and the number of the fertile offshoots; it is then upon their grounds that we have therefore calculated the *absolute fertility coefficient* (the total number of clusters upon a vine log divided by the existing number of fertile offshoots upon the same log) as well as the *relative fertility coefficient* (the total

number of existing clusters upon a vine log divided by the total number of the offshoots which exist upon the same log) which have both been made use of in order to establish the respective offshoots' fertility degree.

For the above mentioned offshoots their *productivity degree* had also been established by calculating their respective *absolute productivity index* ( $A.P.I. = \text{absolute fertility coefficient} \times \text{the mean weight of a cluster}$ ) and *relative productivity index* ( $R.P.I. = \text{relative fertility coefficient} \times \text{the mean weight of a cluster}$ ).

The above mentioned productivity indexes had been therefore calculated at the moment of the grapes' perfect maturity.

The respective values achieved by the *gross output* and by the *commodity production indices* had as well been established at the respective moments of the harvesting and sorting out of the grapes which had issued from the seven vine kinds we had taken into consideration for our study namely: Victoria, Chasselas Doré, Călina, Muscat Hamburg, Coarnă Neagră, Sultanină and Afuz Ali.

## RESULTS AND DISCUSSIONS

### 1. Local climate's distinctive features.

In order to most accurately depict the main climate's offers the vine plants have enjoyed within the Drăgășani zone during the time period going from 2019 until 2020 we have therefore taken the recourse of respectively recording the values held by the local climate's elements which had exerted an obvious impact upon the respective physiological, biological and chemical processes normally occurring within the vine plants that is to say: - fallen precipitations' amounts; - time duration of the effective sun's brightness; - average mean monthly values held by the surrounding air's temperature; - the

atmosphere's achieved levels of humidity; - the *maxima* and *minima* temperature thresholds touched by the vine's surrounding air during the months when the delicate process of the grapes' ripening does become perfected. The consequently obtained results are therefore presented in table nr. 1.

As they had been expressed through the values they had respectively held under annual and multi-annual perspectives the recorded levels touched by the main local climate elements within the Drăgășani zone do lead us towards the conclusion that its climate's distinctive potentialities do indeed allow the vine plants to realize within the grape bacca the perfected synthesis processes of whatever among their intrinsic chemical components no matter how complex their respective structures could be and further more to accomplish them with the greatest among the possible output ratios. The most substantial amounts of fallen precipitations could be recorded during the former part of the active vegetation period (that is to say from April until July) when insofar the vine plants might be concerned their inner growth processes are as a matter of fact predominant while during the active vegetation period's latter part on one side the occurring precipitations' amounts do become restrained yet they are able to remain sufficient in respect to the vine's necessities but instead the local effective sun brightness' duration does increase as the air's held temperatures do come to present some further elevated yet still not quite excessive values. As the grapes' most delicate ripening process does become perfected the level held by the surrounding air's humidity does under no circumstance at all decrease below the border value of 50%. All of these above mentioned issues do thus entitle us to state under the

steadiest of grounds that the vine kinds which are destined to produce table grapes could find within the Drăgășani realm some climate conditions which should effectively allow them to fully express the respective amplitudes of their aptitudes for a high oenological quality level to which they are scientifically entitled through the potentialities of which they intrinsically do dispose.

## **2. Fertility degree with which the offshoots issued from the vine kinds destined to produce table grapes are potentially endowed.**

The offshoots' fertility index does define for a given vine kind the potential fertility degree of the logs which do pertain to a given kind. Should the above mentioned offshoots' fertility index be then determined after the naturally occurred burst of the vine's inflorescences it should respectively constitute the vine plants' inner capacity to form its own fruit-bearing natural organs. In this latter case it is indeed genetically determined and it is influenced not just by the existing pedo-climate's locally created conditions but as well by the culture technologies made use of within the respective plantations. During the wine-making years 2019 and 2020 we have performed some scientific observation procedures and determining measurements the consequent results of which are thereby presented in table nr. 2. The above mentioned offshoots' fertility degree is therefore expressed through the arithmetic values held by the *fertility coefficients* should these be *absolute* (standing from 1,0 until 2,29) and/or *relative* (standing from 0,3 until 1,7). The results by us obtained do indicate the largely important potentials held by the vine kinds destined to produce table

grapes which we have taken into consideration for our study do own in order to achieve some quantitatively considerable grapes harvests – and this does go especially within the Drăgășani vineyard. Among them the Victoria kind does prove to be furthermore outstanding through the highest fertility degree of its offshoots which does anticipate the realization of some effectively great quantities of grapes and through them of some great values for their subsequent commodity production's index.

## **3. Offshoots' productive output in the respectively studied cases of certain vine kinds destined to produce table grapes.**

In order to accurately define the logs' productivity degrees in the cases of certain studied vine kinds it ought at first to be necessary to determine the respectively productive potentials of one of their logs. Together with their fertility degrees the offshoots productive potentials do find themselves submitted to the respectively exerted influences of the environment's circumstances (climate, soil etc.) to which does come to join them the applied culture technology which had been estimated as being the most suitable for each of the concerned fruit-bearing vine plantations. The offshoots' productive potentials are therefore arithmetically expressed through the values held by the *absolute* (50-700) and *relative* (20-500) *productivity indices* which ought to be determined in the autumn season at the exact moment when the grapes' baccas had perfected their maturation process. We have thus presented in Table nr.3 the results we have obtained during the oenological years 2019 and 2020.

Table nr.1. Local climate's features recorded within the Drăgășani vineyard during the vine's active vegetation period (April 1-st – October 31-st).

Climate Element	Period	MONTH						
		April	May	June	July	August	September	October
Mean monthly values of fallen precipitations' amounts (mm)	2010-2020	54,20	92,37	103,77	75,3	37,41	45,16	64,20
	2019	46,20	36,60	207,60	50,2	3,2	0,6	29
	2020	6,2	110,2	76	39,7	31	35,6	56
Mean monthly duration of effective sun's brightness (hours)	2010-2020	211,64	248	278,2	328,7	321,22	241,28	168,55
	2019	149,70	208,9	271,2	330,4	345,60	241,80	213,70
	2020	270,40	236,90	237	315,3	301,60	267,70	153,70
Air's mean monthly temperature values (°C)	2010-2020	12,77	16,79	21,12	23,30	23,87	19,25	12,2
	2019	11,3	16,10	22,00	22,60	24,90	20,00	14,60
	2020	12,6	16,00	20,5	23,3	24,3	21,2	13,8
Humidity level in the atmosphere (%)	2010-2020	x	70,63	68,72	63	58,09	60,54	x
	2019	72	74	65	53	50	x	x
	2020	x	64	71	60	54	58	x
Humidity level in the atmosphere during August at 13 <sup>oo</sup> hours (%)	2010-2020	x	x	x	x	40,45	x	x
	2019							
	2020							
<i>Maxima</i> and <i>minima</i> mean air's temperature thresholds touched from July until September (°C)	2010-2020	x	x	x	31,73	35,72	32,13	x
		x	x	x	11,65	13,19	7,50	x
	2019	x	x	x	34,2	35,2	33	x
		x	x	x	11,2	14,6	6,5	x
	2020	x	x	x	35,5	35,9	35	x
		x	x	x	12,1	14,9	14,9	x

Table nr. 2. Fertility degrees indices as they could be determined in the cases of certain vine kinds destined to produce table grapes which had been cultivated within the Dealul Olt - Drăgășani vineyard.

VINE KIND	YEAR	OFFSHOOTS NUMBER			FERTILITY COEFFICIENT (%)	
		TOTAL	FERTILE	INFLORESCENCES	ABSOLUTE	RELATIVE
Victoria	2019	22,1	15,5	24,8	1,60	1,12
	2020	23,8	16,8	28,5	1,70	1,20
Chasselas Doré	2019	23,3	18,2	32,8	1,80	1,41
	2020	22,8	17,8	35,0	1,97	1,53
Călina	2019	21,4	14,0	21,2	1,51	0,99
	2020	25,6	14,4	20,4	1,42	0,79
Muscat Csaba Pearl	2019	31,4	21,4	32,2	1,50	1,03
	2020	31,6	22,8	33,0	1,45	1,04
Muscat Hamburg	2019	20,0	12,0	17,3	1,44	0,87
	2020	20,2	11,2	18,4	1,64	0,91
Coarnăneagră	2019	24,0	14,6	21,1	1,45	0,88
	2020	26,2	16,0	24,6	1,54	0,94
Sultanină	2019	20,2	12,5	14,7	1,18	0,73
	2020	24,8	13,6	14,8	1,09	0,60
Afuz Ali	2019	17,8	10,4	15,5	1,49	0,87
	2020	19,6	11,8	16,6	1,41	0,84



Table nr. 3. Offshoots' productive output in the respectively studied cases of certain vine kinds destined to produce table grapes which are cultivated within the Dealul Olt - Drăgășani vineyard.

VINE KIND	YEAR	MEAN WEIGHT OF A GRAPE CLUSTER (g)	PRODUCTIVITY INDICES	
			ABSOLUTE	RELATIVE
Victoria	2019	300	480	336
	2020	410	697	492
Chasselas Doré	2019	114	205	161
	2020	125	246	191
Călina	2019	192	290	287
	2020	205	291	126
Csaba Pearl Muscat	2019	122	183	162
	2020	148	215	154
Muscat Hamburg	2019	190	274	165
	2020	170	279	155
Coarnăneagră	2019	146	212	128
	2020	155	239	146
Sultanină	2019	214	253	156
	2020	310	338	186
Afuz Ali	2019	247	368	215
	2020	290	409	244

The quantitative amount of a given grapes' harvest is determined by its respective vine kind's productive potential. The present work does study the cases of some vine kinds producing grapes meant to be consumed in their naturally fresh state (also known as table grapes) where the *commodity production index* is as well taken into consideration; in accordance with the features of each of the concerned vine kinds this latter does come to generally represent 55% until 95% of the total (also known as global) amount of the harvested grapes. The results we have consequently obtained do point out as a duly attested fact the one that the Drăgășani vineyard does provide some particularly supportive conditions in regard to the cultures of the vine kinds destined to produce table grapes. Yet by far among them the undisputed champions (should we speak in the terms of their productivities' indices) are the vine kinds of Victoria and Afuz Ali.

#### 4. The grapes' harvest and its achieved quality level.

In table nr. 4 we have therefore presented the consequent results we have obtained at the exact moment of the grapes' harvesting process accomplished in view of their most efficient revaluation.

In 2019 the respective mean values which had been recorded as being achieved by the grapes' harvest amounts for one log had therefore been situated between 1,712 kg at the Sultanină kind and 3,722 kg at the Victoria kind. The vine kinds for which the ripening process had been perfected later had eventually achieved some less considerable quantitative amounts (such as Afuz Ali with 2,868 kg./log and Coarnăneagră with 2,548 kg/log).

The Victoria kind had by the way presented the highest percentage of „extra” quality level grapes being followed in this regard by the kinds of Călina and Chasselas Doré (both with a ratio of 78%).

Due to the fortuitous appearance of some by far more supportive local climate circumstances in 2020 the quantitative achievement of the yearly grapes' harvest has largely exceeded the amount which had been realized in 2019. However the

kinds of Victoria and Afuz Ali have managed to preserve their above mentioned former highest places.

Table nr. 4. Quantitative amounts of the grapes' harvests and their respectively achieved quality levels in the cases of certain vine kinds for table grapes cultivated within the Dealul Olt - Drăgășani vineyard.

VINE KIND	YEAR	QUANTITATIVE GRAPES PRODUCTION FOR ONE LOG				sugar g/l	acidity	Glucose - acidimetric index
		Total (Kg)	Extra (%)	I-st Quality (%)	Commodity production (%)			
Victoria	2019	3,722	85	9	94	156	4,11	37,9
	2020	6,970	51	33	84	128	3,60	35,6
Chasselas Doré	2019	3,224	78	14	92	206	3,43	61,3
	2020	3,875	85	10	95	191	3,33	57,4
Călina	2019	3,168	78	17	95	254	2,70	94,0
	2020	3,895	80	15	95	248	4,43	56,0
Csaba Pearl Muscat	2019	2,941	65	25	90	164	3,16	51,9
	2020	3,840	79	14	93	195	3,33	58,6
Muscat Hamburg	2019	3,075	73	16	89	206	4,60	44,8
	2020	2,720	60	29	89	182	5,39	33,8
Coarnăneagră	2019	2,548	77	17	94	204	4,06	50,2
	2020	3,410	66	25	91	159	4,21	37,8
Sultanină	2019	1,712	70	22	92	217	4,55	47,7
	2020	4,340	77	15	92	224	3,54	63,3
Afuz Ali	2019	2,868	68	18	86	204	4,16	49,0
	2020	4,060	52	40	92	180	3,73	48,3

## CONCLUSIONS

1. The Drăgășani realm does indeed provide some local climate conditions which do allow the vine kinds destined to produce table grapes to optimally develop their intrinsic growth and further development respective processes thereby ensuring as subsequent results some harvest amounts which could be both qualitatively high and economically profitable;

2. The by us calculated offshoots' fertility indices do attest as a matter of fact that within the Drăgășani vineyard the hereby studied vine kinds producing table grapes are endowed with some effective potentialities which do enable them to realize simultaneously high levels of quantity and quality when it should come to their respective harvests (especially in the cases of Victoria and Afuz Ali);

3. The Victoria kind does realize the highest productivity ratios among the hereby studied vine kinds;

4. The Victoria kind does as well realize the highest quantitative harvest's percentage held for the „extra” quality (which precisely is of 85%).

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