RESEARCHES THAT CONCERN SOME PHYSIOLOGICAL, BIOLOGICAL AND CHEMICAL ISSUES BY NOW RECORDED IN THE CASES OF SOME VINE KINDS DESTINED TO PRODUCE TABLE GRAPES WHICH ARE CURRENTLY CULTIVATED WITHIN THE DRĂGĂȘANI VINEYARD

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Abstract

The productiveness performance ratios of the vine kinds destined to produce grapes for fresh status consumption insofar their respective quantities and quality levels could ever be concerned are effectively influenced by the vine log's leaves'active surface and by its own intrinsic features as these latters could be evaluated through the analyses performed upon the leaves'respectively gained amounts of various macro-elements. In the cases of certain vine kinds such as for example Victoria, Chasselas Doré, Călina, Hamburg Muscat and Afuz Ali the performed investigations have brought up reliable evidence which does concern the existences of their respective vocations for revaluating at their best the pedologic and oeno-climate-related local circumstances graciously offered by this longtime since well-known vine cultivated area. Among these circumstances does as well figure the humanly chosen situation of the concerned vine logs through their precisely calculated positions upon the local hillock'slopes. For all of the hereby studied vine kinds the effective extents of their respective leaves'active surfaces as well as their own intrinsic features are really submitted to the influences which could be exerted by the most highly possible to occur drought time intervals. Under these circumstances the vine logs situated amidst the hillock slope should benefit from the most intense photo-synthesis processes while the greatest respiration capacities could be recorded at the vine logs situated upon the slope's top. However the intensity degrees attended to by the transpiration processes would instead be the highest for the vine logs situated at the slopes'feet.

Key Words: vine kind, climate, temperature, vineyard

INTRODUCTION

In virtue of the prodigalities graciously offered by the local climate in Oltenia the plots where vine is cultivated in order to produce grapes destined for a fresh status consumption do indeed benefit from the existence of some quite significant helio-thermal resources. These are as well sustained by some types of soils endowed by nature with respective vocations concerning the highest quality standards of the vine cultivation process (as for example some carbonated chernozems, anthropically created psammo-soils, brown eumeso-basic ones, pseudo-rendsinian ones or either some argillaceous illuvial soils). All of these soil types do otherwise seem to effectively be steadily structured, suitably areated and well drained. The Drăgășani vineyard which by now is one among the most ancient Romanian vine cultivated regions does dispose of some pedologic and climate conditions which do allow it to host the culture

of the vine kinds meant to produce table grapes. This is indeed a highly opportune addition to its traditionally acknowledged potentiality of creating within itself almost all of the currently existing types of wines. Throughout time in this secondary productive line some quite high quality harvests have by the way been obtained and which have as well presented some among the most convenient should we speak from the business'perspective outputs and should we express them under the terms of the commodity output's index (Gh. Condei and coll. , 2003; E.M. Ionică, I. Olteanu, 2003; A. Popa, 2013, A. Popa and coll. 2015, Şt. Teodorescu and coll., 2021). The scientific researchers from the Research and Production Station in Vine Cultivation and Wine-making of Drăgășani have on the other hand published some quite intensely deepened studies which do concern the cultivation practice focused upon the vine kinds meant to produce table grapes destined for a fresh status consumption but above all some studies respectively dedicated to the intensely undergone physiological, biological and chemical processes which are carried out within the vine plants during their active vegetation period. To these latters does also come to join a prodigiously efficient indeed as well as essentially continuous activity aiming to fundamentally improve the quality levels held by the currently cultivated vine kinds (Gh. Condei, 1974; V. Lepãdatu, Gh. Condei, 1982; Gh. Condei and coll., 1991; Gh. Condei, V. Lepădatu, 2001; Gh. Condei and coll., 2004).

The purpose of the hereby present work is the one of presenting some among the results that we have obtained from 2020 until 2021 and which do concern the physiological, biological and chemical phenomena which could occur within the vine plants meant to produce grapes destined to be consumed while in a fresh status during their active vegetation period and while these do come to be submitted to the active influences exerted by both the pedology-related and the local climate's elements.

APPLIED METHODOLOGY AND MATERIALS MADE USE OF

The hereby described performed experiments have been carried out within a vine plantation dedicated to the cultivation of kinds meant to produce table grapes which does pertain to the Research and Production Station in Vine Cultivation and Wine-making of Drăgășani. The respectively taken into consideration vine kinds have been the ones of: Chasselas Doré, Călina, Hamburg Muscat and Afuz Ali. All of them have been planted into a brown, argillaceous, illuvial and slightly pseudo-glazed type of soil. As for the Victoria kind it is planted within the same area and upon the same brown argillaceous, illuvial and slightly pseudo-glazed type of soil but also and furthermore upon the soil types of anthropic pseudo-rendsinian proto-soil and type-casted eumeso-basic brown which do (all of the three soil types!) happen to be successively present upon the slope of a same hillock'side. The hereby described scientific investigations have been respectively orientated towards: - the studied area's local climate circumstances; - the respective intrinsic features held by the existing soil types; - the determinings of the concerned vine logs'active leave'surfaces and the ones of its inner features; - the respectively amounts of macro-elements contained by the vine's leaves. In order to most successfully seize the local climate's conditions the data have been processed which had been previously gathered by the local Station chaperoned by the National Authority in Meteorology. Apart from the respective soils'analyses'procedures which had been performed in the scientific frame of the OPAS - Olt the other necessary determinings have

been performed within the scientific frame of the above mentioned Vine and Wine-making Station of Drăgășani that is to say within its specialized Vine's Physiology Laboratory.

OBTAINED RESULTS

During the vine's active vegetation period as it has flown along the local climate's general equilibrium the extents of the respective actions taken by the main local climate's active elements are hereby presented in Table nr. 1.

Table nr. 1 Main local climate's elements respectively taken actions during the active vegetation period within the Drăgășani vineyard

Climate's element	Year	MONTH						
		April	May	June	July	August	September	October
Monthly mean temperatures (^{0}C) (1.04 – 30.10)	2020	12,6	16	20,5	23,3	24,3	21,2	13,8
	2021	9,2	16,4	20,6	25,3	24,2	17,9	10,5
Maxima and minima air's temperatures (^{0}C) (1.07 – 30.09)	2020	x	x	x	35,5	35,9	35	x
		x	x	x	12,1	14,9	9	x
	2021	x	x	x	32,2	31,7	24,9	x
		x	x	x	19,2	18	12,4	x
Monthly mean durations of sun's effective brightness (hours) (1.04 – 30.10)	2020	270,4	236,9	237	315,3	301,6	267,7	153,7
	2021	166,3	258,9	246,5	355,9	310	236,4	143,4
Monthly mean amounts of fallen precipitations (mm) (1.04 – 30.10)	2020	6,2	110,2	76	39,7	31	35,6	56
	2021	61,6	85,2	68,2	37,4	32,8	4,2	76,6
Air's achieved humidity levels (U%) (1.04 – 30.10)	2020	x	64	71	60	54	58	x
	2021	x	70,63	68,72	63	58,09	60,54	x

We do find ourselves therefore entitled to state from a scientific perspective that during the time interval when throughout the vine plants'naturally undergone evolution the vegetative development processes are effectively predominant the respective values held by the monthly mean temperatures are more or less following a diminutive trend; however as we should progressively come closer in time to the months from June until August and should even enter within them the above mentioned index would instead reach for some among its highest values throughout the year (that is to say which should stand in-between 20,5^{0}C and 25,3^{0}C) while after those three upmost months this scientifically essential index would definitively adopt a decreasing trajectory until the month of October. Yet should we limit ourselves to our own domain's specific perspective we would have to insist upon the fundamental in this respect circumstance that during the time interval when the grapes'maturation process does take place the hereby studied area does offer some surrounding air's temperature values which do really stimulate the above mentioned natural process and which as well do effectively protect the chemical components which in the meantime are created within the grape's bacca. This oenologically essential issue is also pointed out by the recorded values of the air's

temperature during the months from June until September included at their respective maxima and minima limits which could sometimes directly influe upon the development of the above mentioned process which does evolve during the above evoked months. For this vineyard the monthly mean time intervals of the effective sun's brightening function is taken into consideration as being a rather great one (especially during July and August) but in this naturally blessed region of Romania the sun could as well shine for a pretty long time throughout the following months of September and even of October and such highly supporting circumstances do ensure for the perfection degree of the grapes'maturation process the best chances it could ever have to be accomplished. As for the precipitations'amounts created within the atmosphere throughout the vine's active vegetation period these could usually fall by following a relatively uniform distribution trajectory.Their respective amounts do seem to effectively present some more quantitatively significant values during the months of May and June; the formers are then followed by some diminished yet still sufficient amounts fallen during July and August; then the respective water amounts do keep on restricting themselves during the month of September and around the first decade of October. Under such climate conditions the vine's grapes (which in the meantime have fulfilled their maturation process) should most fortunately become as well better protected in regard to the various existing and active pathogenic agents. Should it be during the year's hottest months which are July and August the values respectively taken by the scientific index of the air's relative humidity attended level could never diminish throughout this region under the border limit of 54%.

Nature itself has chosen to quite miraculously mould the relief forms assumed by this vineyard. Its practically infinite throughout its variety endowment in taken forms, slopes and exposure degrees towards the sun's offered light has been also and most happily joined by a exquisitely balanced scale of oenologically useful altitudes; the local climate's main features do stand among the most highly supporting ones ever since these are distinctively defined by the genuinely natural absence of whatever too much accentuated active trends which could point towards no matter should it be an excessive supply or either an insufficient one. This vineyard is geographically situated along the valley of the river Olt and this circumstance does effectively ensure for it the permanent action taken by a surrounding air's rather caressing movement. Due to which it also does always dispose of a suitable level held by the air's humidity – should this even happen during the months of July and August which throughout the year are indeed the hottest ones. This gathering of so many most highly suportive climate conditions has ultimately convinced the scientists of our domain to state that within the chosen perimeter of the Drăgășani vineyard the most genetically endowed and oenologically revaluable among its cultivated vine kinds are indeed absolutely able to find the most supportive environment ever which is perfectly able to allow them to fully express the integrality of the respective intrinsic amplitudes owned by their oenologic vocations for a highest quality level which is by the way always aimed to by their obtained harvests.

The border values assumed by the scientific indices through which could be expressed the naturally active phenomena related to the discipline of physics and to the local climate's directly exerted impact upon the soil types wherein the vine plantation dedicated to the Victoria kind is geographically speaking situated are hereby represented in Table nr.2.

Table nr. 2. Nowadays existing types of soil and their main inner features along the hillock'slope whereupon the Victoria kind is planted (Dealul Olt – Drăgășani)

Soil type's inner features		Soil Type		
		(Slope's upside third part) Anthropic pseudo-rendsinian proto-soil	(Slope's middle third part) Brown argillaceous illuvial slightly pseudo-glazed soil	(Slope's downside third part) Type-casted eumeso-basic brown soil
Succession of genetic horizons		AC (0-25 cm) – Cpr (25-55 cm) – Cca (55 – 120 cm)	II_0 (0-40 cm) – BE (w)(45-820 cm) – Bt (80 – 120 cm)	A_0 (0-30 cm) – AB (30-60 cm) – Bv (60-90) – Bc (90-100)
Granulometric fractions	Sand (%)	70 - 94	45 - 50	56 - 71
	Dust (%)	2 - 24	16 - 18	8 - 14
	Argile (%)	3 - 12	33 - 37	21 – 28
		Scientific indices pertaining to soils'physics		
Apparent density (g/cm^3)		1,15 – 1,43	1,40 – 1,41	1,50 – 1,60
Total porosity (%)		48 - 58	48 - 49	41-45
Withering coefficient (%)		1,6 – 6,7	8,4 – 10,9	5,5 - 7,3
Fields'capacity (%)		7,3 – 21,9	23,4 – 24,1	22,5 – 22,9
		Scientific indices pertaining to soils'chemistry		
pH into water		8,1 – 8,5	5,2 – 6,4	6,2 – 6,4
Humus (%)		0,1 – 0,5	0,60 – 1,34	0,50 – 1,65
Total nitrogen amount (%)		0,002 – 0,010	0,009 – 0,080	0,030 – 1,63
Mobile phosphorus'amount (ppm)		6 - 24	16 - 32	10 - 20
Mobile potassium amount (ppm)		4 - 100	110 - 120	80 - 160
V (%)		28 - 100	85 - 93	92 – 93

Throughout the hillock slope's anthropically established pseudo-rendsinian type of soil from its upside third part the performed studies have proven that it does present the features of being clayish-argillaceous, crumbly, cohesive, broken-up and also endowed with a diffused amount of calcium carbonate throughout the whole of its mass. The Cpr horizon does present some intensely violent effervecence phenomena. Its rough fraction is largely predominant instead of its fine fractions. It is as well excellently supplied with potassium but instead barely supplied in humus, nitrogen and phosphorus. Within the slope's middle third part the type-casted brown argillaceous illuvial existing soil does present a clayish-argillaceous texture; it does present a meanly compact status as well as it is moderately humid and poreous. Its effectively useful capacity of retaining water is rather small. It is meanly supplied in humus and in nitrogen of a mineral origin but it is instead only not enough supplied in phosphorus and in potassium.

Upon the downside third part of the concerned slope the soil does pertain to the type-casted brown eumeso-basic genre. It does present a clayish texture; it also is simultaneously poreous, weakly compact and humid while within it the respective amounts of humus, nitrogen and phosphorus are just some small towards mean ones. For the vine kinds destined to produce fresh status table grapes that are cultivated within the Drăgășani vineyard the results respectively obtained under the above described climate conditions and insofar could have been concerned the local pedological status but still focused upon the vine plants'vegetative development's processes are thereby presented in Table nr. 3.

Table nr. 3 The vegetative growth of the varieties of table grapes cultivated within Drăgășani vineyard

Vine Kind	Active leave'surface (square meters/vine log)		D.S.* into the leave				F.S.** into the leave	
			(%) DS percentage amount		(g) DS/density for a square meter		(g) FS/density for a square meter	
	2020 (24.07)	2021 (4.08)	2020 (24.07)	2021 (04.08)	2020 (24.07)	2021 (04.08)	2020 (24.07)	2021 (04.08)
Victoria – slope's downside third part	3,24	3,13	34,96	31,07	0,63	0,64	204,12	200
Victoria – slope's middle third part	2,88	4,39	35,23	31,51	0,66	0,69	190,08	303
Victoria – slope's upside third part	3,01	3,06	35,40	27,99	0,68	0,62	204,68	190
Chasselas Doré	3,57	4,07	36,21	28,04	0,59	0,61	210,63	248
Călina	3,52	4,03	33,54	36,50	0,71	0,82	249,92	330
Hamburg Muscat	5,11	2,14	35,32	36,79	0,92	0,87	470,12	186
Afuz Ali	552	3,35	35,16	32,63	0,68	0,64	375,36	214

*DS – dry substance

**FS – fresh substance

The vine logs'active leave'surfaces as well as the dry substance's respectively recorded amounts have been scientifically evaluated during the final decade of July and the first one of August when for the above mentioned indices their respective maxima values have been recorded. From the analysis of the hereby presented data we have thus drawn the conclusions that during 2020 the vine logs'active leave'surfaces have achieved the performing realization of a quite good efficiency level and this quite happy event has occurred in spite of the prior fact that it had also been slightly afflicted before by the same year'supervened drought time interval. The above mentioned index has presented some values which have been situated in-between 2,88 square meters (for the Victoria kind situated upon the hillock'slope's middle third part) and 5,25 square meters for the Afuz Ali kind. For the same year 2020 the amounts of dry substance (%) held by the vine leaves'limbs have oscillated in-between 33,54% for Călina și 36,22% for Chasselas Doré. In anul 2021 instead the same amounts of dry substance (%) have been situated in-between 27,99% for the Victoria kind situated on the slope's upside third part and 36,79% for the Hamburg Muscat.

The results obtained through the vine plants'mineral nutrition technologically applied procedure have therefore been pointed out by being represented in Table nr. 4. The respective determinings have thus been performed throughout the end of July and August's beginning intervals.

Table nr. 4 Mineral nutrition aspects of the grapevine varieties

Vine Kind	Global Alimentation (%)		Alimentary Equilibrium (%)	
	2020 (06.08)	2021 (26.07)	2020 (06.080)	2021 (26.07)
Victoria – at the slope's feet	3,146	2,324	75,6 - 3,9 -20,5	72,5- 6,7 - 20,8
Victoria – amidst the slope	2,677	2,141	76,9 – 4,9 – 18,2	70,2 – 8,4 – 21,4
Victoria – upside of the slope	2,457	2,050	75,9 – 9,8 – 14,3	69,4 – 9,7 – 20,9
Chasselas Doré	2,869	2,102	76,3 – 4,3 – 19,4	69,4 – 8,8 – 21,8
Călina	2,899	2,128	76,2 – 4,0 – 19,8	68,1 – 8,6 – 23,3
Hamburg Muscat	3,313	2,208	63,7 – 3,9 – 32,4	67,2 – 9,9 – 22,9
Afuz Ali	3,077	2,154	73,1 – 4,5 – 22,4	2,154 – 7,5 – 23,2

We have thus come to ascertain the respective facts that the vine's global alimentation process as well as its consequent alimentary equilibrium are both submitted to the influences respectively exerted by the rather aleatory climate conditions through which every harvest year could be defined simultaneously with the soil type the vine plant has been planted in. Some quite considerable differences could therefore be yearly created among the kinds'obtained harvests that should be due to the position held by the vine plantation upon the concerned slope and simultaneously to the local climate's fortuitous events through which every oenological year could be the most accurately defined.

Throughout the vine's global alimentation process it is nitrogen which is for the most represented. For example in 2020 a vine log's phosphorus'consumed amount has been variable in-between 3,9 (Victoria upon the slope's upside third part) and 9,8 (Victoria upon the slope's downside third part).

Should we then study the obtained results in the respective regards of the vine logs active leave'surface and of the same leaves'contained amounts of macro-elements we could therefore ascertain the respective facts that in the case of the Victoria kind should it be planted upon various segments of the concerned hillock'slope the consequently obtained results would become different among themselves insofar could ever be concerned the: - quality levels themselves achieved by the harvested grapes; - the vine logs'inner strength; - the effective development processes undergone by the vine plants and expressed through the scientific disciplines of physiology, biology, chemistry and enzyme'study.

CONCLUSIONS

1. Around Drăgășani during the vine's active vegetation period the main local climate's elements do manifest some values which by their existence do demonstrate the facts that within that zone the vine kinds that are the most suitable in order to produce table grapes which could be consumed under a fresh status are indeed able to develop their respective growth and fruit-bearing processes under the best possible among circumstances. A lot of scientific indices as for example the: - *maxima* and respectively *minima* values attended by the air's temperature (from July until September); - the monthly mean values achieved by the same air's temperature; - the great durations in time of the effective sun's brightness; - the fallen precipitations'respective amounts and distributions; - the levels respectively held by the air's humidity – are demonstrating that within the studied zone the local climate does manifest no excessive phenomena at all no matter should these be some fortuitous yet noxious supplements or either insufficiencies.

2. Within the Dealul Olt vineyard from the Drăgășani zone the main types of soils which are present do indeed own some intrinsic features that are naturally preferred by the vine plants – especially insofar could be concerned the respective soils'oenological assets. The distinctive feature held by this vineyard is the one that all of its soil types are successively present upon the sloped side of an one and only hillock.

3.The vine kinds destined to produce table grapes which should be consumed under a fresh status are effectively dependent upon the local climate's provided conditions, upon the soil types these are planted within and upon the respective kinds'own genetic patrimonies. Those natural correlations are therefore scientifically expressed through indices such as the extent of the vine's active leave'surface, the leaves'respectively contained amounts of dry substances and their respecctively contained amounts of macro-elements.

4. The situation of vine plants issued from the Victoria kind upon various segments of the above mentioned hillock'slope has by itself determined some quite significant influences it has therefore exerted upon the vine logs'respective intrinsic strengths, upon their alimentary equilibrium and upon the evolutions of their undergone physiological, biological, chemical and enzyme-related inner phenomena. In a prior work of our own we have by the way demonstrated the respective facts that: - should the vine logs be situated amidst the slope the intensity of their undergone photo-synthesis process would reach for its upmost level of all; - should then the logs be situated upon the upside third part of the slope their undergone respiration process would be the most intense of all; - while should the vine logs be situated at the slope's feet their undergone transpiration process would instead be the most intense of all.

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