

DRĂGĂȘANI VINEYARD DISPLAYS FAVORABLE CLIMATE CONDITIONS FOR THE GROWING OF VINE VARIETIES THAT ARE GRAPE-PRODUCING INTENDED FOR FRESH CONSUMPTION

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ABSTRACT

In the researches made on the climatic offer from the Drăgășani vineyards, analysed during the period 2010 - 2020, I discover that its miraculously shaped by nature terrain, with an infinite variety of shapes, slopes and exhibitions and with a contented dosed scale of altitudes; the most favourable basic climatic features, marked particularly by the absence of any excesses or insufficiencies; its location along the Olt river valley, which ensures an easy, permanent movement of the air, always disposing of a good humidity even in July - August, the warmest months - all these are natural conditions that decided that the most gifted and sweet Romanian and foreign varieties to find in Drăgășani the most favourable environment to fully express the breadth of their skills. This is the place of origin for many local vine varieties, producing grapes for wine or for fresh consumption

INTRODUCTION

Table grape varieties are grown on a wide range of selections, noted for its qualitative vocation, the lands on the airy hills coast, well brightened, with long autumns, dried and with light loamy-sandy grape varieties, well drained on the inside and on the outside. The particularly pleasant taste of the grapes and the beneficial effects of their consumption have drawn attention to the nutritional and sanogenic value.

Compared to many other fruits, table grapes have been and are preferred by consumers of all ages. Compared to most of the prepared food and vegetables, where the vitamins are destroyed, fresh grapes bring into the body all the necessary vitamins.

The composition of the grape recommends it as a muscular and nervous energizer, antitoxic, remineralizing, liver stimulant, diuretic, laxative, facilitator of the elimination of gallbladder; grapes representing "the miraculous pharmacy of nature".

The cultivation of the grapevine varieties is of great perspective in Oltenia, in fact until 1990, the table grape varieties occupied approx. 4000 ha. and produced approx. 800 tons of grapes representing merchandise production.

In the pre-phylloxera viticulture, there were cultivated local varieties: Mierlească, Alunică, Timpurie; but also the indigenous varieties: White Horn, Black Horn, Pink Razachie, Black Razachie, Goat's Tits, Cârlogancă (with mixed function), Asma, etc. In post-phylloxera viticulture, there were cultivated the varieties: Muscat Perla de Csaba, Chasselas Lore, Muscat de Hamburg, Afuz Ali and more recently Cardinal, Italy, Thames, Greece, Otilia and especially Victoria.

¹ Condei Gh. 1971; 2003; Bishtawi Abdel, 2005

² Dejeu Liviu, 2010; Olteanu I. și Colof, 2002

³ Popa A. Condei Gh., 2006

⁴ Popa A., 2012

⁵ Popa A. & Colaf, 2015, TeodorrescuȘt. & Calsob, 2021

In order to outline the areas in Oltenia with a calling for table grapes, I proposed a research program in order to capture the factors that decide the quality of table grapes.

In this paper I demonstrate that the Drăgășani vineyard displays of favourable climatic conditions to obtain high quality table grapes.

MATERIAL AND METHOD

The climatic elements that decide the manner the grapevine carries out its growing and developing processes refer to: average annual temperature, summary atmospheric precipitation, sum of temperature degrees during the vegetation period (01.04. - 31.10.2020), sum of hours with sunshine during the vegetation period, sum of precipitation during the vegetation period.

As the growing and fruiting processes of the grapevine are influenced by the manifestation of the daily and monthly climatic elements, recourse was made to highlight them in every month of the vegetation period. Climatic data was selected from the National Meteorological Administration, and its influence on the vital-metabolic processes of grapevine that is a producer of grapes intended for fresh consumption, can be deduced from its manifestation itself, gathered by the numerous studies and researches carried out throughout time.

RESULTS AND DISCUSSIONS

Data about global warming, its causes and consequences is increasingly abundant.

From of the desire to capture how the climate in Drăgășani vineyard has evolved in the last 80 years, I extracted some data, also important for the cultivation of grapevine, regarding the main elements of the climate, to be precise, average data for different periods of the last 80 years. The results obtained are presented in Table 1.

The average annual temperature during the period 1937 - 1970 was 10.800C, so that during the period 2010 - 2020 to reach 12.310C. so a difference of more than 1.510C, compared to 80 years ago. The annual amount of rainfall was 660.5 mm (in 1937), 684 mm (1961-1971) and 705.95 mm (2010-2020). Also here is detected a difference of extra 21.95 mm.

Table 1

**CLIMATE CHARACTERISTICS OF DRĂGĂȘANI VINEYARD
(average data 1937 - 2020)**

CLIMATIC ELEMENT	PERIODS			DIFERENCE (+, -) 1937 – 1942
	1937-1942	1961-1970	2010-2020	
AVERAGE ANNUAL AIR TEMPERATURE (°C)	10.8	10.8	12.31	+ 1.51°C
SUM OF ANNUAL RAINFALL (mm)	660.5	684	705.95	+ 21.95 mm
SUM OF TEMPERATURE DEGREES DURING THE PERIOS 01.04 – 31.10 (°C)	3644.30	3.316	5,744.56	+ 2,100.26°C
SUM OF THE SUNSHINE HOURS DURING THE PERIOD 01.04 – 31.10	1405	1576	2810.30	+ 1405.30 h
SUM OF PRECIPITATIONS DURING THE PERIOD 01.04 – 31.10	391.96	385	443.39	+ 51.43 mm

I am also witnessing the increase of the amount of temperature degrees during the vegetation period (01.04. - 31.10) from 3644.3°C (1937-1942) to 5744.56°C (2010-2020), so an increase of 2150°C. In the same sense of increase, it is detected regarding the

duration of sunshine (+ 1405 hours). Also during the vegetation period, I am witnessing an increase in precipitation (+ 51.43 mm). For the cultivation of grapevine, in general, and especially for table grape varieties, the manifestation of climatic elements during the vegetation period is of the most significant importance. In table 2 I present during the same intervals of the 80 years for each month, which was the mark of climate events.

Table 2

**CLIMATE CHARACTERISTICS OF DRĂGĂȘANI VINEYARD
DURING THE PERIOD 01.04 – 31.10
(average data 1937 – 2020)**

CLIMATIC ELEMENT	PERIOD	MONTH						
		APRIL	MAY	JUNE	JULY	AUGUST	SEPT.	OCT.
AVERAGE MONTHLY RAINFALL (mm)	1937-1942	65.6	81.1	99.5	69.2	52.3	44.1	53.3
	1961-1970	61	70	83	80	52	39	29
	2010-2020	54.20	92.37	103.77	75.3	37.41	45.16	64.20
AVERAGE MONTHLY DURATION OF SUNSHINE (HOURS)	1937-1942	129	233.1	241.3	298.2	305.2	210.5	152.5
	1961-1970	200	252	277	314	295	239	191
	2010-2020	211.64	248	278.2	328.7	327.22	241.28	168.55
AVERAGE MONTHLY AIR TEMPERATURE (°C)	1937-1942	10.5	16.0	20.2	22.9	20.9	17.1	11.5
	1961-1970	11.6	16.4	19.6	21.7	27.5	17.3	12.4
	2010-2020	12.77	16.79	21.12	23.30	23.87	19.25	12.2
ATMOSPHERIC HUMIDITY (11%)	1937-1942	x	X	X	x	X	X	x
	1961-1970	66	67	68	63	65	71	72
	2010-2020	x	70.63	68.72	63	58.09	60.54	x
ATMOSPHERIC HUMIDITY IN AUGUST, HOUR 13.00 (2010-2010)	1937-1942	x	x	x	x	X	X	x
	1961-1970	x	x	x	x	48	X	x
	2010-2020	x	x	x	x	40.45	X	x
MAXIMUM AND MINIMUM TEMPERATURE IN MONTHS JULY-SEPTEMBER (AVERAGE)	1937-1942	MAXIMUM			38.5	36.5	31.6	x
	1961-1970	MAXIMUM			X	36.6	33.7	x
		MINIMUM			X	9.3	3.3	x
	2010-2020	MAXIMUM			31.73	35.72	32.13	x
MINIMUM			11.65	13.19	7.50	x		

Precipitation have almost a uniform distribution. More during the period when at the grapevine predominate the growing processes (May-July) and less when the grape maturation processes predominate (August-October).

The average monthly duration of sunshine increases during the period April - August, while in September it decreases, but not a lot. In October, in Drăgășani, there is plenty of sunshine duration.

The average monthly temperature is established to be higher during the period 1961 - 2020. It should be emphasized that the warmest month remains July, followed closely by August.

Regarding the atmospheric humidity, there are no big differences between the three periods. It remains enough for the grapevine. Not even in August at 13:00 hour, the atmospheric humidity does not decrease, only accidentally below 40%.

The maximum and minimum temperature in July-September distinguishes close values in the three periods of the 80 years.

More significant differences being noted at the minimum temperature, but always above the freezing limit.

Considering that during the period 2010 - 2020 there were recorded slightly higher values by the climatic elements, compared to the period 1937 - 1970, I emphasized their values, during the vegetation period, for each wine year.

Table 3 displays the evolution, during the vegetation period of the grapevine, of the average monthly temperature.

Although different, the average monthly temperature, from the months when at the grapevine predominate the growing processes (April - June) does not change too much from one year to another and is the one that ensures the good conditions for the grapevine.

The warmest month remains July, followed by August, after which in September and October I recorded temperatures that support the ripening process of the grapes.

In 2012, the average temperature in July registered the highest values (26.9°C).

In August 2019 the warmest month was August, with 24.9°C as value.

It is established that in September the average monthly temperatures have relatively close values (with some exceptions), but in October the values of the average monthly temperature differ more from one year to another (from 9°C to 14.6°C).

Table 3

AVERAGE MONTHLY TEMPERATURE (°C) IN THE DRĂGĂȘANI VINEYARD DURING THE VEGETATION PERIOD (01.04 - 31.10) 2010 - 2020

YEAR	MONTH						
	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
2010	11.8	10.5	20.4	22.7	24.4	17.7	9
2011	11.6	16.5	20.6	22.4	22.8	21.3	10.9
2012	13.7	16.8	23.1	26.9	24.8	20.5	14.3
2013	13.7	18.8	20.7	22.8	24.1	16.8	12.3
2014	11.6	15.7	19.2	21.7	22.4	17.7	11.7
2015	11.8	17.8	20.5	25.3	23.5	19.3	10.7
2016	14.7	15.3	21.7	23.8	23	19.5	9.5
2017	11.1	16.3	22.6	23.2	24.6	18.7	12.8
2018	16.6	18.9	21.1	21.7	23.8	19.1	14.6
2019	11.3	16.1	22	22.6	24.9	20	14.6
2020	12.6	16	20.5	23.3	24.3	21.2	13.8
AVERAGE 2010-2020	12.77	16.79	21.12	23.30	23.87	19.25	12.2
AVERAGE 1961-1970	11.6	16.4	19.6	21.7	21.5	17.3	12.4
AVERAGE 1937-1942	10.5	16.0	20.2	22.9	20.9	17.1	11.5

Table 4 illustrates the average monthly duration of sunshine (2010 - 2020) for each month of the vegetation period.

Table 4

AVERAGE MONTHLY DURATION OF SUNSHINE (HOURS) IN DRĂGĂȘANI VINEYARD DURING THE VEGETATION PERIOD (01.04 - 31.10) 2010 - 2020

YEAR	MONTH						
	APRIL	MAY	JUNE	JULY	AUGUST	SEMPEMBER	OCTOBER
2010	209	247.7	257.1	305.5	324.3	216.4	121.4
2011	210.8	251.2	299.5	333.4	350.5	282.6	201.3
2012	230.4	213.7	364	372.4	346.2	268.2	203.1
2013	229	312.3	297.7	355.3	321.3	248.6	194
2014	142.7	255.5	230.8	294.3	329.8	211.2	107.8

2015	254.1	278.9	288.8	383.8	287.6	206.3	135.9
2016	200.8	232.6	263.8	327.6	278.3	222.4	95.8
2017	187.7	217.8	313.6	318.8	315.9	225.4	206.1
2018	243.5	272.5	236.7	278.9	332.5	264.5	227.3
2019	149.7	208.9	271.2	330.4	345.6	241.8	213.7
2020	270.4	236.9	237	315.3	301.6	267.7	153.7
AVERAGE 2010-2020	211.6 4	248	278.2	328.73	321.22	241.28	168.55
AVERAGE 1961-1970	200	252	277	314	295	239	191
AVERAGE 1937-1942	129	233.1	241.3	298.2	305.2	210.5	152.5

In Drăgășani, during the entire vegetation period of the grapevine, there is registered a high number of hours when the sun shines, which is favourable for this plant.

The longest periods of sunshine are in May-August. Although the sun shines less in September and October, the sunshine hours are enough to complete the ripening process of the grapes under the best circumstances.

Precipitation fallen during the vegetation period by their monthly enlargement and distribution definitely influence the quantity and quality of grape harvest. Those registered during the period 2010 - 2020 are presented in table 5.

Table 5

**RECORDED AVERAGE MONTHLY RAINFALL (MM)
IN DRĂGĂȘANI VINEYARD DURING THE VEGETATION PERIOD
(01.04 - 31.10) 2010 - 2020**

YEAR	MONTH						
	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
2010	55.2	117.2	99.4	29.2	41.6	18.3	83
2011	29.3	54.2	74.9	96.8	18.8	4.2	37.2
2012	76.2	129.4	10.6	26.8	30.2	16.2	36.4
2013	50.2	35	82.8	57.8	21.8	99.4	140.2
2014	151.4	179.4	152.6	205.2	59	41.8	55.2
2015	43	47.4	51	8.2	104.2	118.3	74.6
2016	59.2	78.6	46.6	28.8	18.6	94	70.1
2017	61.8	132	13.8	110.4	32	36.8	114
2018	17.6	96.1	202	175.2	51.2	31.6	10.6
2019	46.2	36.6	207.6	50.2	3.2	0.6	29
2020	6.2	110.2	76	39.7	31	35.6	56
AVERAGE 2010-2020	54.20	92.37	103.77	75.3	37.41	45.16	64.20

The months that are with the most precipitation are May and June, starting with July the precipitations are reduced but, in general, there are in sufficient quantities. In three years (2014, 2017, 2018) most of the precipitation fell in July, except for 2015 when the rainiest month was August. The precipitations, in general, more reduced starting with August, make the maturation process of grapes to take place under the best conditions so that the harvest is protected from the grey rot attack.

Analysing the data presented in table 6, regarding the average maximum and minimum air temperatures (°C) from the Drăgășani vineyard, during the vegetation period throughout the 80 years, I found out that occasionally minimum temperatures are recorded in May and October.

Table 6

**AVERAGE AIR TEMPERATURES (°C) MAXIMUM AND MINIMUM
FROM DRĂGĂȘANI VINEYARD DURING THE VEGETATION PERIOD
(01.04 - 31.10) 2010 - 2020**

PERIOD	TEMP	MONTH						
		APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
1937-1942	Max.	29	32	38	38.5	36.5	31.6	30.5

	Min.	2.5	-0.5	6.3	7.5	5.5	2.0	- 3.5
1961-1970	Max.	x	x	x	x	36.6	33.7	x
	Min.	x	x	x	x	9.3	3.3	x
2010-2020	Max.	x	x	x	31.73	35.72	32.13	x
	Min.	x	x	x	11.65	13.09	7.0	x

Maximum temperatures frequently arise in July and August and less frequently in June, September and October. It should be mentioned that the average maximum temperatures did not exceed 38.5⁰C (June - 1937-1942) and that there are no major differences between the three periods analysed during the study.

The relative humidity of the air during the vegetation period (Table 7) did not fall below 58%.

Table 7

RELATIVE AIR HUMIDITY (⁰C) FROM DRĂGĂȘANI VINEYARD DURING THE VEGETATION PERIOD (01.04 - 31.10) 2010 - 2020

PERIOD	MONTH						
	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
2010-2020	X	70.63	68.72	63	58.09	60.54	X
1961-1970	66	67	68	63	65	74	X
1937-1942	67	72	69	64	59	62	X

It has higher values in April and June. Starting with July and until October the values are slightly lower, as a consequence of fewer rainfall, but enough for the plant to go through the ripening period of the grapes in good conditions, this also due to the influence of the accumulation lakes of the Olt river and the existence of forests at the base of the hills. In the household, there is a slow and permanent circulation of air.

For the period 2010-2020, the relative humidity of the air is presented in table 8.

Table 8

RELATIVE AIR HUMIDITY (⁰C) FROM DRĂGĂȘANI VINEYARD DURING THE VEGETATION PERIOD (01.04 - 31.10) 2010 - 2020

YEAR	MONTH						
	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
2010	x	73	74	73	67	71	x
2011	x	72	71	68	58	53	x
2012	x	74	59	47	47	52	x
2013	x	58	70	60	57	61	x
2014	x	78	69	73	67	70	x
2015	x	68	67	54	58	71	x
2016	x	72	69	57	61	60	x
2017	x	76	61	62	54	59	x
2018	x	67	71	74	63	61	x
2019	x	72	74	65	53	50	x
2020	x	64	71	60	54	58	x
AVERAGE	x	70.63	68.72	63.0	58.09	60.54	x

....% in August, at 13.00 hour, on average 40.45 (2010 - 2020), alternating between 50% (2010) and 30% (2012)

It is discovered that at this stage (2010 - 2020), during the vegetation period, as a result of precipitation, numerous values of relative air humidity are higher.

If I refer to the relative air humidity in August at 13:00, I discover low values between 30% (2012) and 50% (2010). If these low values (below 40%) of the relative air humidity are registered several days in a row is possible for the process of photosynthesis to be disturbed and even interrupted. As a consequence, the grapes become dehydrated, no more sugars are accumulated and no more acids are burned. This phenomenon is dangerous especially when the relative humidity of the year is below 40%, several days in a row starting with the last decade of July and August.

Table 9 presents the data regarding the maximum and minimum temperatures recorded in Drăgășani, during the vegetation period when the grape ripening process takes place (July - September).

Table 9

AIR TEMPERATURES (⁰c); MAXIMUM AND MINIMUM, FROM DRĂGĂȘANI VINEYARD DURING THE PERIOD JULY-SEPTEMBER (2010-2020)

MONTH					
JULY		AUGUST		SEPTEMBER	
34.1	13	36.4	14.9	30.4	8.2
34.9	11	35.4	13.4	34.1	11
38.3	16.1	38.7	11.2	32.7	7.7
36.5	13.3	35.3	12.3	28	6.8
31	12.6	33.2	12.6	27.4	7.2
36.6	13	35.5	12.4	35.1	9
34.4	14	35.4	11.5	32.1	7
36.4	12.8	38.7	10.3	32.7	6.6
31.3	12.1	33.3	15.9	33	3.6
34.2	11.2	35.2	14.6	33	6.5
35.5	12.1	35.9	14.9	35	9
31.73	11.65	35.72	13.19	32.13	7.50

The recorded values confirm that in the vineyard there are not registered maximum or minimum temperatures that would disturb the ripening process of the grapes.

CONCLUSIONS

1. The climatic conveniences of which the Drăgășani vineyard benefits, allows the grapevine to realize in grapes, in large proportions, the synthesis of any of the constituents, however complex their chemical structure might be.

2. The abundance of climatic availability is not complemented by climatic hardness, which causes the grapes, at the same time, to deteriorate the constitutive harmony, through losses and degradations.

3. The climatic elements with impact over the physiological-biochemical processes of the grapevine that ensure the vocation for plant quality refer to temperature, precipitation, insolation. It is discovered that these climatic elements that manifest in the Drăgășani vineyard have decided that the most gifted and valuable Romanian and foreign varieties to find here the most favourable environment to fully express the extent of their quality skills.

4. The vocation for quality of the Drăgășani vineyard, from the climatic point of view, is deceived by the presence of some plants with specific to the Mediterranean areas, such as: fig (*Ficus carica*), thorns (*Ruscus aculeatus*), mimosa (*Albizia jullibrissi*), magnolia (*Magnolia sp.*), the forest bat (*Daphne mezereum*) and the lilies (*Conzalaria marginalis*).

BIBLIOGRAPHY

1. Bishtawi Abdel Majid AnnacdMohad, 2005 - The wine growing areas in eastern Oltenia - Romania, where table grapes can be cultivated. PHD Thesis. University of Craiova, Faculty of Horticulture.
2. Condei Gh., 1997 – Resistance of grapevine to some unfavourable conditions and parasitic diseases under the influence of chemical fertilizers... I.C. V.V. Valea Călugărească, vol. VIII.
3. Condei Gh., Ciolacu M., Seiculescu M., 2003 – Elaboration of the methodology for the multi-territorial determination of the areas that obtain DOC-IC vitipomic products through ... qualitative ecological vocation..... I.C. V.V. Valea Călugărească, vol. XVIII.
4. Dejeu Liviu, 2010 - Viticulture. Publisher Caraș, Bucharest.
5. Olteanu Ion, Cichi Daniela, Costea Dorin, Mărăcineanu Liviu, 2002 – Special viticulture.
6. Popa A., Condei Gh., 2006 - The Behavior of the Victoria King into the Mediterranean Ecological by stem (Spain) and into the temperate one (Romania). Annals from University of Craiova, vol. XI (XLII).
7. Popa A., 2012 – Viticulture from Oltenia between reconstruction and development. Publisher Alma, Craiova.
8. Popa A., Ciungea N., Genoiu Traian Cătălin, 2015 - Oltenia Small wine- growing Romania, Publisher Aius, Craiova.
9. Popescu Adriana, 1943 – Monography of Drăgășani vineyard, Publisher „Bucovina” I.E. Toroțiu, Bucharest.
10. Teodorescu Șt, Popa A., Sandu Gh., 2021 – Romanian ornoclimate. Second edition, Publisher Aius, Craiova.