THE CLIMATIC CHANGES AND THEIR IMPACT ON THE GRAPEVINE IN THE MURFATLAR VINEYARD CONDITIONS

MODIFICĂRILE CLIMATICE ŞI IMPACTUL LOR ASUPRA VIŢEI DE VIE ÎN CONDIŢIILE PODGORIEI MURFATLAR

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Abstract*. The knowledge concerning the climate changes impact on the development of the grapevine are reduced in contrast with those referring at the annual plant (Jones G. V. and collab., 2005; Stock M. and collab., 2005). In this context it was imposed to effectuate a laborious study concerning the behaviour of the main grapes varieties from the Murfatlar vineyard, with the aim to improve the breeding technologies for to maximise the utilization of the abiotic factors specifics of this ecosystem. In the Murfatlar vineyards conditions in the last period, it was observed an early debut of the phenophasis with until 1 to 2 weeks for bud opening and flourish and from 2 to 3 weeks for mellow and full maturity. Synthesising in interdependence the climatic factors analysed on the 5 years period, it can be take the conclusion that in the interval of the years 2003-2007, comparison with the multiyear mean of the last 50 years is unique and in the general note of the "global warming process". It was token in consideration also the influence of the building of Danube-Black Sea canal which split the vineyard Murfatlar from West to East, on the microclimate – increasing the days with mist, the modification the air currents.*

Rezumat. *Cunoştinţele privind impactul schimbărilor climatice asupra dezvoltării viţei de vie sunt relativ restrânse faţă de cele referitoare la plantele anuale (Jones G. V. şi colab., 2005; Stock M. şi colab., 2005). În acest context a devenit imperios necesară efectuarea unor studii multianuale privind comportarea principalelor soiuri de viţă de vie din podgoria Murfatlar cu scopul de a adapta tehnologiile de cultură în sensul maximizării utilizării factorilor abiotici specifici acestui tip de ecosistem. În condiţiile podgoriei Murfatlar, în ultima perioadă a fost observată o devansare a debutului perioadei de vegetatie prin declanşarea mai timpurie cu 1-2 săptămâni a dezmuguritului şi înfloritului şi cu 2-3 săptămâni a pârgii şi maturităţii depline. Analizând în interdependenţă evoluţia factorilor climatici pe o perioada de 5 ani, se poate concluziona că în intervalul 2003-2007, faţă de mediile multianuale ale ultimilor 50 de ani, la Murfatlar se resimte procesul de «încălzire globală ». Trebuie luată în considerare şi influenţa Canalului Dunăre-Marea Neagră în acestă zonă, deoarece acesta brăzdeaza podgoria de la Vest la Est, microclimatul schimbându-se prin creşterea numărului zilelor cu ceaţă şi prin modificarea curenţilor de aer, favorizând local căderile de grindină.*

MATHERIAL AND METHOD

In 2003-2007 period the behaviour of the next varieties it was studied, in the Murfatlar vineyard conditions: Chardonnay, Muscat Ottonel, Riesling italian,

Sauvignon, Pinot gris, Columna, Cabernet Sauvignon, Pinot noir si Mamaia. It was done the observation and analysis in whole vegetative period on the dynamic of main phenophasis, registering also the variation of the climatic factors: the air temperature, the hours of sunshine and the precipitations, calculating the next climatic indexes: the global and utile thermal balances, the sunshine index and hydro balance.

RESULTS AND DISCUSSIONS

From the point of view of the thermal rapport the years 2003-2007 have a similar evolution, with some particularities on the vegetative intervals. Therefore, the repose period (November-March) in the 2003 year was relatively could in comparison with the same period in 2004, 2005 and 2007, years with normal thermal regime. In the 2006 winter, face with a normal year values it was registered very lows temperatures. In 2007 the winter was no rains and the temperatures vary between -9.0°C in the night and 21.0°C in day with strong winds. All these affected the buds viability and fertility.

In generally, on the all studied years, the global thermal balance (table 1) has good values in comparison with multiyear normal and the utile thermal balance is bigger in 2007 (3569,9°C) face with the normal value (2247,9°C). In the rest of the years the registered values was smaller than the normal.

The active vegetative period (bud-opening - the end of the shoots growing and grapes formatting, April – July) has a good global thermal balance, generally bigger than the normal - 2229,8 °C (between 2177°C in 2004 and 2587 °C in 2007). The utile thermal balance has very goods values in 2007 (1992,7 °C face with 1501,9 °C- the normal). In the rest of years the values was sensible lowers face with the normal (between 957 °C in 2004 and 1376°C in 2003).

The thermal balance it was not correlated with the sunshine index registered in the active period (table 1). If in the years 2003 (with 1091,8 hours), 2006 (with 1062,1 hours) and 2007 (with 1060,7 hours) it was in the normal values for Murfatlar, in the years 2004 (with 937,9 hours) and 2005 (with 839,9 hours) it was very low face with the multiyear normal – insufficient for to assure the normal photosynthetic conditions for good assimilation of the nutrients and to achieve high quality of the harvest (under 1000 hours). The 2007 year excel by 2252,9 hors of sunshine face with a normal of 2176,6 hours, followed by the year 2006 with 2116,8 hours.

The pluviometric regime (table 2) exercise a favourable influence on the harvest health by low quantities of precipitations registered in August: 144,8 mm in 2004, 131,6 mm in 2007, 69,9 mm in 2006 and respectively registered in September: 167,3 mm in 2003, 142,8 mm in 2005, 86,6 mm in 2006 and 76,2 mm in 2007. The severe drowght from the first mounths of vegetative periode beside of the raines falled at the mellow and full maturation of grapes where the stress factors which affected mainly white varieties, influencing in negative way the quality of grapes and wines.

Table. 1

Global and utile temperature balance and sunshine hours, Murfatlar (2003-2007)

Vegetative period		Global temperatures balance ∑t°C						Utile temperatures balances ∑t°C						Sunshine ∑ hours					
Month	Interval	Normal value (multiyear)	2003	2004	2005	2006	2007	Normal value (multiyear)	2003	2004	2005	2006	2007	Normal value (multiyear)	2003	2004	2005	2006	2007
XI	I	***228,1***	310	204	262	192	212	34,9	10	0	0	5,6	2,9	87,2	40,7	67,6	67,6	91,5	150,1
XII		***255,1***	-	84	127	95	145	3,4	-	0	0	3,5	0	66,1	57,7	95,6	44,2	84,3	73,6
I		***4,1***	25	-	102	-98	202	0,6	0	-	0	0	4,3	63,5	33,0	28,6	69,1	46,9	63,5
II		***62,6***	-	61	-	9,2	120	2,7	-	0	-	0	1,2	84,5	72,4	54,6	49,0	95,7	84,8
III		***125,6***	34	266	139	222	236	9,3	0	0	0	40	14,8	111,7	101,2	153,8	125,4	159,8	117,7
∑T		***675,5***	**369**	**615**	**630**	**420**	**915**	**50,9**	**10**	**0**	**0**	**49,1**	**23,2**	**413,0**	**305,0**	**400,2**	**355,3**	**478,2**	**489,7**
IV	II	***369,7***	270	369	336	346	314	53,8	-	69	36	59	28,5	160,7	168,8	170,1	163,2	160,5	160,7
V		***513,7***	663	490	558	530	618	703,7	363	180	248	220	308,6	261,8	299,6	213,0	206,1	320,4	261,8
VI		***620,1***	726	639	658	682	761	328,1	426	339	358	382	761,2	314,5	315,2	259,3	223,3	248,5	314,5
VII		***726,3***	887	679	753	750	894	416,3	587	369	443	440	894,6	323,7	308,2	295,5	247,3	332,7	323,7
∑T		***2.229,8***	**2.546**	**2.177**	**2.305**	**2.308**	**2.587**	**1.501,9**	**1.376**	**957**	**1.085**	**1.101**	**1.992,7**	**1.060,7**	**1.091,8**	**937,9**	**839,9**	**1.062,1**	**1.060,7**
VIII	III	***671,0***	765	709	756	871	798	361,0	455	399	446	471	798,0	305,5	316,4	196,5	212,7	328,0	305,5
IX		***521,3***	480	555	615	558	611	252,7	189	255	315	299	611,1	221,0	169,9	189,5	150,8	107,9	221,0
X		***373,1***	356	488	375	409	447	81,4	46	178	65	51,6	144,9	176,0	84,9	175,4	159,3	140,6	176,0
∑T		***1.565,4***	**1.601**	**1.752**	**1.746**	**1.838**	**1.856**	**695,1**	**690**	**832**	**826**	**822**	**1.554**	**702,5**	**571,2**	**561,4**	**522,8**	**576,5**	**702,5**
∑TG		***4.470,7***	**4.516**	**4.544**	**4.681**	**4.566**	**5.358**	**2.247,9**	**2.076**	**1.789**	**1.911**	**1.972,1**	**3.569,9**	**2.176,2**	**1.968,0**	**1.899,5**	**1.718,0**	**2.116,8**	**2.252,9**

Table 2

Regim of precipitations - 2003-2007 at Murfatlar vineyard

Anul / Lună	Media multianuală mm	2003	2004	2005	2006	2007
I	31,0	53,2	35,1	64,3	*7,7*	24,3
II	33,0	12,0	30,7	32,4	35,6	***18,8***
III	21,7	27,6	19,2	34,5	76,6	31,2
IV	33,5	24,2	*1,4*	32,2	34,1	31,3
V	50,2	*7,8*	**140,8**	24,0	73,7	***17,4***
VI	53,2	22,4	65,2	27,2	*16,7*	12,6
VII	35,6	31,4	37,7	**207,2**	**130,1**	***4,2***
VIII	31,6	16,1	**144,0**	24,6	**69,9**	**131,6**
IX	41,6	**167,3**	***13,5***	**142,8**	**86,6**	**76,2**
X	30,2	71,7	***8,9***	50,7	4,8	83,0
XI	40,4	25,0	***9,3***	104,1	25,8	53,0
XII	34,0	19,4	93,6	29,9	***7,5***	***9,4***
∑	**436,0**	**478,2**	**599,4**	**773,9**	**569,1**	**493,2**

The 2005 year excelled with 207,2 mm rains felled only in July and by the total year value: 773,9 mm precipitations, an exception year for the last 50 years, being followed by 2004 year with 599,4 mm and 2006 with 569,1 mm precipitation/ year.

The evolution of the phenophasis in this period was shorted with 5 to 10 days in comparison with the multiyear normal (figures 1 and 2).

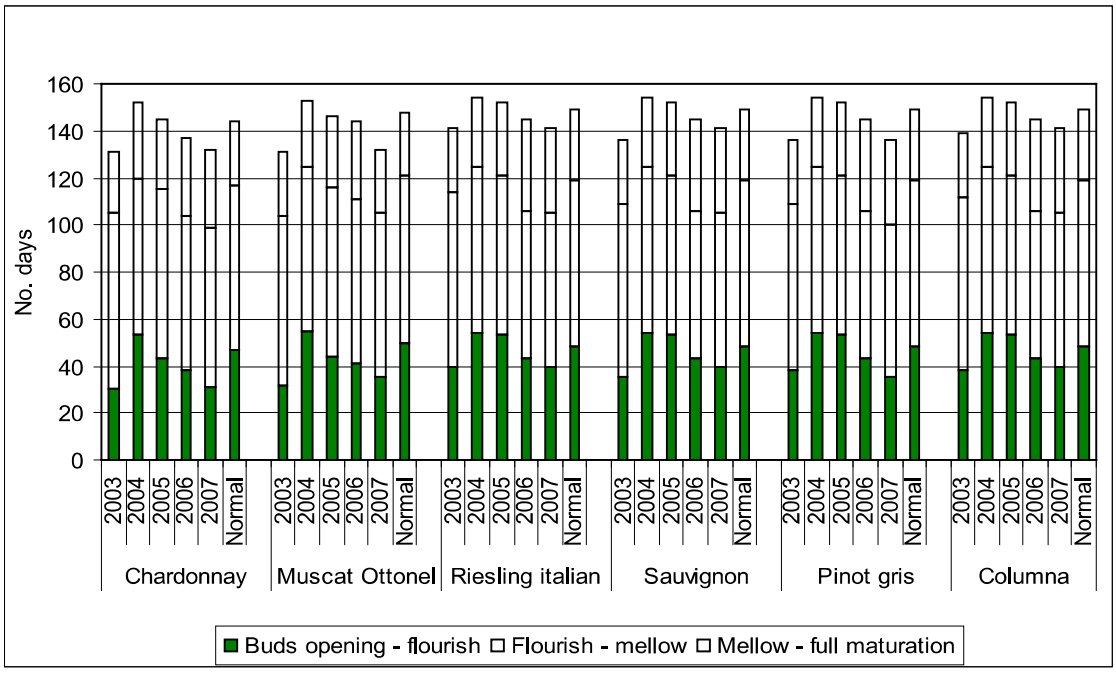

Fig. 1: The phenophasis evolutin at the white varieties, Murfatlar 2003-2005

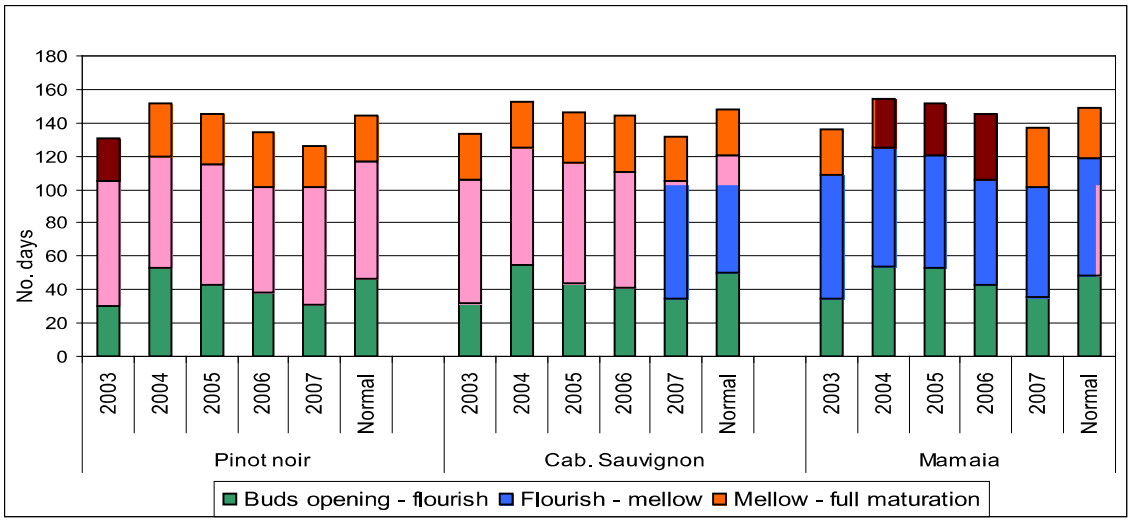

Fig. 2: The fenophasis evolution at the red varieties, Murfatlar 2003-2005

The bud opening started early in all 5 years, between April 13 and May 5-th. The flourish is developed between May 28 and June 15, being longer with 7 days than the normal. After this time, the abiotic conditions (air temperatures, sunshine) accelerate the succession of the other phenophasis.

The full maturity was noted after the second part of September, exception being Muscat Ottonel which is matured earlier.

The quality of grapes is sown in figures 3 and 4. It is observed that in case of the white varieties, Chardonnay and Pinot gris give constantly high quality grapes. The 2003 and 2007 years have very good conditions for quality wines.

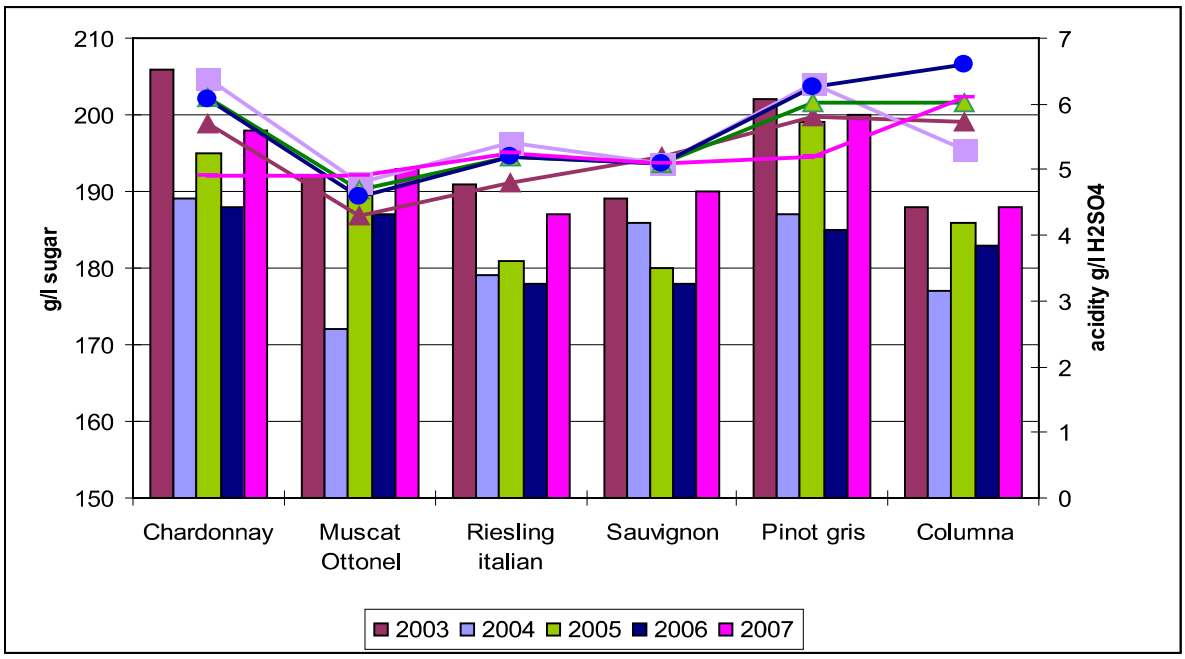

Fig. 3: Grapes quality at white varieties, Murfatlar 2003-2007

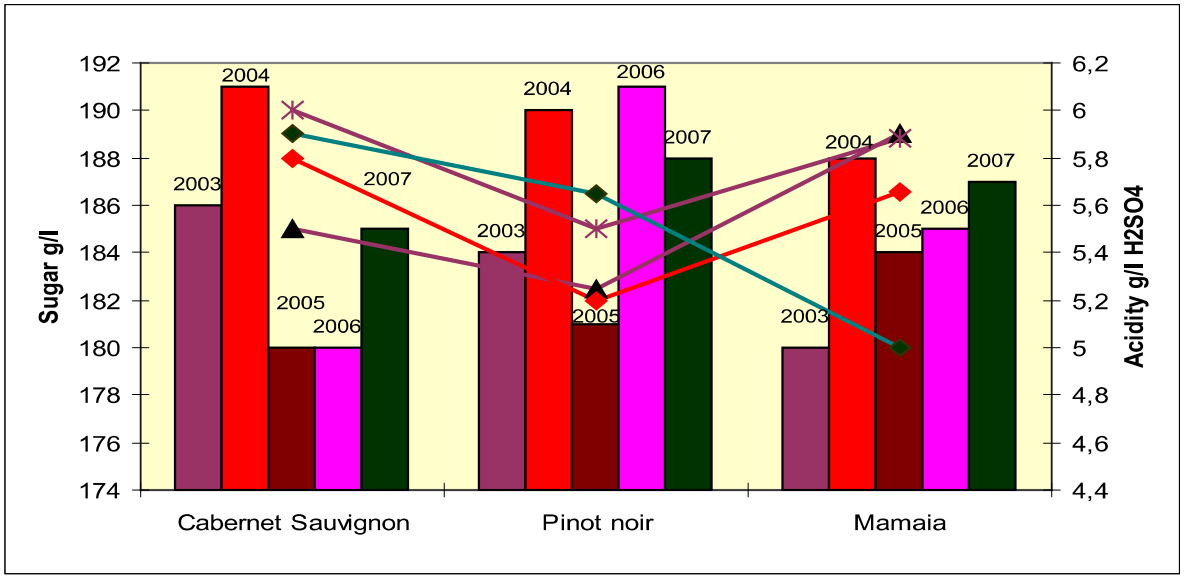

Fig. 4: Grapes quality at reds varieties, Murfatlar 2003-2007

CONCLUSIONS

In generally, all 5 studied years has particularities both in inactive and vegetative period under global and utile thermal aspect.

The sunshine values level was near the multiyear normal, exception being the year 2007 with highest sunshine values.

The total amount of precipitation was bigger than the normal in each studied year but in May, June, August and September was frequently registered lack of rains and was installed dryness phenomenon.

The progress of phenophasis was between 168 and 197 days, shortest in 2003 year and logiest in 2005 year.

The grapes quality was mentained in the normal multiyearly values, the years 2003 and 2007 excelling by quality conditions assured.

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