BEHAVIOUR OF SOME SOUR CHERRY IN THE CONDITIONS OF NORTH-EAST REGION OF ROMANIA (I)

COMPORTAMENTUL UNOR SOIURI DE VIŞIN ÎN CONDIŢIILE DN NORD-ESTUL ROMÂNIEI (I)

IACOB F., GRĂDINARIU G., ISTRATE M., ZLATI Cristina, DASCALU M.
University of Agricultural Sciences and Veterinary Medicine Iaşi, Romania

Abstract: *Sour cherry, a species always present in public gardens and orchards, has undergone continuous improvements both in technological aspects and varieties assortment. While today sour cherry culture in Europe knows a new "breath", especially by increasing the number of plants per unit surface in conjunction with obtaining rootstocks and varieties of low vigor, existing plantations can be "subject to" detailed studies to better understand the secrets of the specie. This paper comes with new information regarding at biology and fenology of some sour cherry cultivars cultivated in echo-pedo-climatic conditions from North East of Romania.*

Key words: sour cherry, cultivar, trunk cross section area, vigour

Rezumat. *Specia vişin, prezentă pretutindeni în grădinile populaţiei, şi în livezi a fost subiectul unor studii continui atât din punct de vedere al tehnologiei cât şi al îmbunătăţirii sortimentului de soiuri. În timp ce, în zilele noastre, cultura vişinului cunoaşte în Europa o "renaştere" în special prin creşterea numărului de plante pe unitatea de suprafaţă, concomitent cu obţinerea de portaltoi şi soiuri de vigoare redusă, există plantaţii care pot fi "supuse" unor studii amănunţite în scopul unei mai bune înţelegeri a "secretelor" acestei specii. Această lucrare vine cu noi informaţii referitoare la biologia si fenologia unor soiuri de vişin cultivate în condiţiile pedoclimatice din Nord-Estul României.*

Cuvinte cheie: vişin, soi, secţiune transversală a trunchiului, vigoare

INTRODUCTION

This paper aims to investigate the possibilities to quantify the influence of environmental conditions from the North-East region of the country and also anthropogenic upon sour cherry growth and development processes and to contribute to changing some technological links in order to obtain higher yields.

Worldwide trend of fruit consumption facilitates, geographical area where we are, new structural dimensions, determined mainly by the emergence of private property holdings, resize the plantations in the favorability area, experience and professional tradition.

In the current economic and social situation, sour cherry crop earns extra attention from private producers, sour cherry as fruit growing species being considered as "rustic" specie using better the areas and land unsuitable for other crops.

MATERIAL AND METHOD

To specify the behavior of some varieties of sour cherry, stationary study method was used, which refers to learning through phenological observations of tree growth and development. Biometric measurements were conducted which were interpreted according to the specific conditions of the research area.

The biological material studied included 10 existing varieties in a 28 years old plantation inside the former Farm no. 8 of SCDP Iasi. There were studied four foreign cherry varieties (Northstar, Oblacinska, Schattenmorelle, Engleze timpuri*i*) and six Romanian varieties (Ilva, Nana, Pitic de Iasi, Scuturator, Crisana 2, Mocanesti 16) exist in the current assortment.The varieties are grafted on mahaleb rootstock and planted according to their vigor:

- planting distances: 5 m between rows and 4 m between trees on the row (500 trees/ha) for the following varieties: Scuturator, Engleze timpurii, Crisana2, Mocanesti 16, pyramidal crown shape.

- planting distances: 4 m between rows and 2 m between trees on the row (1250 trees/ha) for the following varieties: Northstar, Oblacinska, Ilva, Nana, Schattenmorelle, Pitic de Iasi, crown shape: slender spindle. Promoting the valuable varieties, well adapted to climate and soil conditions is a measure of the utmost importance to fruit growing. Research objectives were focused on the influence of the variety upon the tree vigor, aiming to: fructification organs phenology, tree height, average crown diameter, trunk cross-section area (SSTT), crown volume (V), and average length of annual growth. Experimental data were statistical processed using analysis of variance, the degree of significance between variants being played with the difference limit (DL), particularly in case of experimental variants settlement in randomized blocs (Saulescu NA, Saulescu NN, 1967, Jităreanu G., 1994).

RESULTS AND DISCUSSIONS

Fructification organs stages are specific for each biology species and the starting date and duration are related to the climatic condition of each year (tab 1.).

Table 1

Fructification stages date in climatic conditions of 2009 in Iaşi

Phenology / Variety	Fructification stages						
	The beginning of flower buds swelling	The start of bud openin g	The start of blossomi ng	Full floweri ng	The end of blossomi ng	The start of ripening	Harvest maturity
Northstar	27.03-11.04	15.04-23.04	20.04-2.05	25.04-6.05	30.04-11.05	6.07-17.07	26.07-29.07
Oblacinska	28.03-12.04	13.04-24.04	19.04-1.05	24.04-4.05	28.04-8.05	24.06-30.06	5.07-10.07
Nana	28.03-11.04	14.04-23.04	19.04-1.05	24.04-5.05	29.04-9.05	29.06-30.06	8.07-15.07
Ilva	28.03-11.04	15.04-24.04	20.04-2.05	24.04-6.05	29.04-10.05	5.07-7.07	14.07-26.07
Schattenmorelle	27.03-13.04	17.04-22.04	20.04-2.05	25.04-7.05	30.04-12.05	1.07-15.07	21.07-30.07
Pitic de Iasi	28.03-13.04	18.04-27.04	24.04-3.05	29.04-8.05	30.04-13.05	12.07-21.07	27.07-1.08
Scuturator	27.03-12.04	15.04-24.04	19.04-1.05	24.04-.5.05	28.04-.9.05	30.06-5.07	7.07-8.07

Engleze timpur	28.03-13.04	11.04-26.04	18.04-28.04	23.04-2.05	29.04-8.05	5.06-7.06	13.06-14.06
Crisana 2	26.03-11.04	16.04-23.04	19.04-30.04	24.04-5.05	30.04-10.05	27.06-1.07	8.07-19.07
Mocanesti 16	26.03-12.04	16.04-22.04	19.04-29.04	24.04-4.05	30.04-9.05	18.06-20.06	26.06-10.07

The start of flowering at studied sour cherry varieties occurred in 2009 between 18.IV and 3.V and the end of flowering between 28.IV and 13. V. Average data on flowering ongoing in 2009 in Iasi region occurred between 23.IV and 8.V. Flowering duration was between 6-12 days for 2009.

Number of days from the end of flowering to harvest maturity was between 40-50 days in sour cherry varieties with early ripening (Engleze timpurii), 50-60 days at varieties with medium ripening (Scuturator, Mocanesti 16, Crisana 2) and more than 60 days in late ripening varieties (Schattenmorelle, Ilva, Pitic de Iaşi).

Table 2

Trees average high in 28th year after planting at studied sour cherry varieties

Nr crt	VARIETY	Trees average high in 2009(m)	% to the control	Difference to the control (m)	Significat ion
Planting distances: 4 x 2 m					
1	Northstar	3.30	126.92	0.7	XXX
2	Oblacinska	2.85	107.69	0.2	X
3	Ilva	3.06	119.23	0.5	XXX
4	Nana	2.12	80.77	-0.5	OOO
5	Schattenmorelle	2.23	84.62	-0.4	OOO
6	Pitic de Iasi	1.99	76.92	-0.6	OOO
	Average (x)	2.59	100	0.0	-
DL 5% = 0.1		DL 1% = 0.2		DL 0.1% = 0.4 m	
Planting distances: 5 x 4 m					
7	Scuturător	3.95	95.24	-0.2	OO
8	Engleze timpurii	4.17	98.34	-0.1	-
9	Crisana 2	4.32	102.38	0.1	-
10	Mocanesti 16	4.55	107.14	0.3	XXX
	Average (x)	4.24	100	0.0	-
DL.5% = 0.1		DL 1% = 0.2		DL 0.1% = 0.3 m	

In the conditions of Iasi area, sour cherry fruits maturation begins generally in the second decade in June with the varieties: Engleze timpurii and ends in late July and early August with Pitic de Iaşi variety. Staggering fruit harvest of studied sour cherry varieties and hybrids provides a 40 days varietal conveyer.

Sour cherry varieties with small vigor, planted at 4 x 2 m distance, registered the highest values of tree height in year 28 after planting, at Northstar (3.30 m) and Ilva (3.06 m) varieties. There were statistically highly significant positive differences to the average variety. In case of varieties with medium-high vigor, planted at 5 x 4m distance, the highest value of this indicator was obtained from Mocanesti *16* variety (4.55 m). Scuturator variety (3.95 m) registered negative distinct significant differences to the control (the average) (table 3).

Trunk cross section area in 28th year after planting at sour cherry varieties under study, showed values between 69.19 cm^2 (Nana), and 150.46 cm^2 (Oblacinska)

when planting distances were 4 x 2 m. In case of 5 x 4 m planting at distances the trunk cross section area was between 227,79 cm^2 (Scuturator) and 281,03 cm^2 (Engleze timpurii) (table 4.). Besides height, crown diameter is an important indicator because the space between trees should be used judiciously, the crowns must occupy the space between trees per row, avoiding crown interpenetration, and the interval between the rows to allow performing the mechanical work.

Table 3

Trunk cross section area in 28th year after planting at studied sour cherry varieties

Nr crt	VARIETY	Trunk cross section area in 2009 (cm^2)	% to the control	Difference to the control (cm^2)	Signific ation
Planting: 4 x 2 m					
1	**Northstar**	138.97	128.23	30.6	XXX
2	**Oblacinska**	150.46	138.84	42.1	XXX
3	**Ilva**	122.87	113.38	14.5	XXX
4	**Nana**	69.19	63.84	-39.2	OOO
5	**Schattenmorelle**	94.59	87.27	-13.8	OOO
6	**Pitic de Iasi**	74.52	68.73	-33.9	OOO
	Average (x)	108.43	100	0.0	-
DL 5% = 1.8		DL 1% = 2.5		DL 0.1% = 3.7 cm²	
Planting distances: 5 x 4 m					
7	**Scuturător**	227.79	85.80	-37.7	OOO
8	**Engleze timpurii**	281.03	105.84	15.5	XXX
9	**Crisana 2**	277.53	104.52	12.0	XXX
10	**Mocanesti 16**	275.67	103.84	10.2	XXX
	Average (x)	265.50	100	0.0	-
DL 5% = 3.1		DL 1% = 4.7		DL 0.1% = 7.5 cm²	

Table 4

Trees crown average diameter in 28th year after planting at studied sour cherry varieties

Nr crt	VARIETY	Crown average diameter in 2009 (m)	% to the control	Difference to the control (m)	Significa tion
Planting distances: 4 x 2 m					
1	Northstar	3.01	125.00	0.6	XXX
2	Oblacinska	2.47	104.17	0.1	X
3	Ilva	2.96	125.00	0.6	XXX
4	Nana	2.03	83.33	-0.4	OOO
5	Schattenmorelle	2.34	95.83	-0.1	O
6	Pitic de Iasi	1.55	66.67	-0.8	OOO
	Average (x)	2.40	100	0.0	-
DL 5% = 0.1		DL 1% = 0.2		DL 0.1% = 0.4 m	
Planting distances: 5 x 4 m					
7	Scuturător	4.45	91.84	-0.4	OO
8	Engleze timpurii	4.43	89.80	-0.5	OO
9	Crisana 2	5.20	106.12	0.3	X
10	Mocanesti 16	5.70	116.33	0.8	XXX
	Average (x)	4.90	100	0.0	-
DL 5% = 0.2		DL 1% = 0.3		DL 0.1% = 0.6 m	

Extreme values of this index were between 1.55 m at Pitic de Iasi variety and 3.01 at Northstar variety for 4 x 2 m planting distances. Vigorous variety had an average diameter between 4.43 m at *Engleze timpurii* variety, respectively 5.70 m Mocanesti 16 variety, statistically recording positive very significant differences to the control (table 4).

Knowing the biological peculiarities of sour cherry varieties, allows a differential approach of culture technologies in terms of: green area, trees vigor and fructification type, crown shape and planting distances. Data on crown volume at studied sour cherry varieties were followed, while the maintenance and fructification pruning, intended to limit height and crown width expansion.

Table 5 presents data on tree crown volume in 28th year after planting at 10 sour cherry varieties. The largest crown volume, in case of small-medium vigor varieties, was obtained from Northstar variety (27.56 m³/tree) and the lowest crown volume was recorded at Pitic de Iasi variety (4.72 m³/tree).

Table 5

Crown trees volume in 28th year after planting at studied sour cherry varieties

Nr crt	VARIETY	Crown trees volume in 2009 (m³)	% to the control	Difference to the control (m³)	Signification
Planting distances: 4 x 2 m					
1	Northstar	27.56	180.39	12.3	XXX
2	Oblacinska	16.03	104.58	0.7	-
3	Ilva	24.80	162.09	9.5	XX
4	Nana	7.56	49.67	-7.7	OO
5	Schattenmorelle	11.25	73.86	-4.0	-
6	Pitic de Iasi	4.72	30.72	-10.6	OOO
	Average (x)	15.30	100	0.0	-
DL 5% = 4.8		DL 1% = 6.8		DL 0.1% = 9.8 m³	
Planting distances: 5 x 4 m					
7	Scuturător	60.87	64.04	-34.2	OOO
8	Engleze timpurii	75.45	79.39	-19.6	OOO
9	Crisana 2	107.70	113.25	12.6	XXX
10	Mocanesti 16	136.29	143.32	41.2	XXX
	Average (x)	95.10	100	0.0	-
DL 5% = 2.0		DL 1% = 3.0		DL 0.1% = 4.7 m³	

Between varieties with medium-high vigor, the largest crown volume was recorded at *Mocanesti 16* variety (136.29 m³/tree) and the lowest value was recorded at *Scuturator* variety (60.87 m³/tree).

The average length of annual growth was between 6.8 cm at *Oblacinska* variety with negative very significant difference to the control and 11.1 cm at *Pitic de Iasi* variety with a positive significant difference compared to the varieties average. Varieties planted at 5 x 4m distances, average length of annual growth was 9.75 cm at *Engleze timpurii* variety and 19.26 cm at *Mocanesti 16* variety (table 6).

Table 6

Average length of annual growth in 28th year after planting at studied sour cherry varieties

Nr crt	VARIETY	Average length of annual growth in 2009 (cm)	% to the control	Difference to the control (cm)	Signification
Planting distances: 4 x 2 m					
1	Northstar	7.46	78.12	-2.1	OOO
2	Oblacinska	6.8	70.83	-2.8	OOO
3	Ilva	9.7	101.04	0.1	-
4	Nana	11.4	118.75	1.8	XX
5	Schattenmorelle	11.14	115.63	1.5	XX
6	Pitic de Iasi	11.1	115.63	1.5	XX
	Average (x)	9.60	100	0.0	-
DL 5% = 1.0		DL 1% = 1.4		DL 0.1% = 2.1 cm	
Planting distances: 5 x 4 m					
7	Scuturător	11.08	81.02	-2.6	-
8	Engleze timpurii	9.75	71.53	-3.9	-
9	Crisana 2	14.6	106.57	0.9	-
10	Mocanesti 16	19.26	140.88	5.6	X
	Average (x)	13.7	100	0.0	-
DL 5% = 4.0		DL 1% = 6.1		DL 0.1% = 9.8 cm	

CONCLUSIONS

1. Analyzing trees growth vigour in the orchard, expressed by trunk section area, sour cherry varieties can be grouped in three categories of vigour: **high**, (trunk section area over 200 cm^2) Scuturator, Engleze timpurii, Crisana 2 and Mocanesti 16., **medium** vigour (with trunk section area between 100 -200 cm^2) Northstar, Ilva, Oblacinska, and **small** vigour (with trunk section area between 50-100 cm^2) Nana, Schattenmorelle, Pitic de Iasi.

2. Trees crown vigour is very much influenced by crown shape and it's correlated with fructification type, planting distances and agro-techniques applied.

3. Fructification organs development shows significant differences between varieties. Varieties order of fruit maturation it's always the same with the difference that the time interval between two successive varieties varied as climate conditions are more or less favorable for fruits ripening.

4. Ensuring proper planting distances according to varieties vigour varieties as recommended assortment includes both varieties with high and small vigour.

REFERENCES

1. Bodi I., 1981 – *Soiuri de vişin recomandate pentru zona Iaşi*. Lucrări ştiinţifice ale S.C.P.P.-Piteşti, vol. IX. Redacţia de propagandă tehnică agricolă, Bucureşti.

3. Grădinariu G., 2002 – *Pomicultură specială*. Editura Ion Ionescu de la Brad, Iaşi.

4. Grădinariu G., Istrate M., 2003- *Pomicultură generală şi specială*. Edit. Tipografia Moldova; Iaşi.

5. Gherghi T., 1980 – *Cercetări privind stabilirea unui sortiment optim la vişin prin studiul culturii de concurs a celor mai valoroase soiuri autohtone, străine şi hibrizi de perspectivă.* Teză de doctorat, Inst. Agr. Bucureşti.

6. Istrate M., 1998 – *Contribuţii la stabilirea sortimentului de vişin pentru zona de N-E a Moldovei,* Teză de doctorat Institutul Agronomic Iaşi.