

## GROWTH AND FRUCTIFYING CHARACTERISTICS OF SOME SOUR CHERRY TREES VARIETIES LEAD UNDER THE SHAPE OF PALMETTA WITH OBLIQUE BRANCH CROWN SHAPE

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**ABSTRACT** - *The experiment was conducted during 2004-2005 at the Fruit-growing Research Station of Iași on 16 sour cherry trees varieties. The sour cherry trees engrafted on sour cherry rootstock were planted at 3.5 x 4 m and 3.5 x 2 m and lead under the shape of palmetta with oblique branch crown shape. The soil was tilled between the tree rows. The highest crown shape was obtained in 16-17 years after planting in Scuturător and Nana varieties (5400 m<sup>3</sup>/ha) and the lowest in the Ilva and Pitic de Iasi varieties (3700 and respectively, 2800 m<sup>3</sup> /ha). The low productivity of some varieties was caused by unfavourable climatic conditions during flowering, especially in some self-sterile or partially self-fertile varieties. The palmetta with oblique branch crown shape can be used in average vigour varieties, presenting greater ramification angles: Erdi Bötermő, Drobeta, De Botoșani, Nana, Ujfőhértői fűrtős, and Meteor Korai.*

**Keywords:** *Sour cherry trees, crown shapes, phytosanitary experiments, fruit yields*

## INTRODUCTION

The efficient revaluation of soil and climatic factors from the N-E area of Romania, by using greater fruit trees densities per area unit and some adequate crown shapes, is required for early fruiting of sour cherry trees and getting high fruit yields (Bodi, 1977; Bodi, 1987).

The experiment was set up in 1988 at the Fruit-growing Research Station of Iași, and it controlled the behaviour of fruits trees, lead under the shape of palmetta with oblique branch crown in some new sour cherry trees, cultivated under intensive system (Istrate et al., 1998).

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## MATERIALS AND METHODS

The study on the behaviour of some sour cherry trees varieties was conducted within two competition cultures, set up in 1988.

The first competition culture has comprised nine sour cherry trees varieties, planted at the distance of 3.5 x 4 m, with a density of 714 trees/ha. The second competition culture has comprised seven sour cherry trees varieties with low vigour, planted at the distance of 3.5 x 2 m, with a density of 1428 trees/ha.

The used biological material has comprised 16 sour cherry trees varieties (variants). Each variant has included 20 trees, with four replicates of five trees. The variants were placed in randomized blocks. The fruit trees were grafted on sour cherry tree generating stock and lead under the shape of palmetta with oblique branch crown. As a support, we have used a trellis with 4 wires, spaced between them at 50 cm. The system of soil management was the tilled field.

We carried out phytosanitary experiments for controlling the main sour cherry tree diseases and pests: *Coccomyces hiemalis* Higg, *Ascospora beijerinkii*, *Monilia* sp. and *Rhagoletis cerasi*.

During the experiencing period, observations and determinations were done on the volume of trees crown, resistance at frost and diseases and on fruit physical and chemical characteristics.

## RESULTS AND DISCUSSION

The volume of fruit tree crown was very much influenced by the shape of adopted crown, in correlation with the fructification type of varieties, planting distance and applied soil management.

The studied sour cherry trees varieties have shown, under planting conditions of 3.5 x 4 m, in the year XVII of vegetation, a crown volume comprised between 3.8 m<sup>3</sup>/tree (*Drobeta*) and 8.2 m<sup>3</sup>/tree (*Erdi Nagygyümölcsü*) (*Table 1*).

The sour cherry trees varieties with low vigour had a crown volume between 2.0 m<sup>3</sup>/tree (2856 m<sup>3</sup>/ha) in *Pitic de Iași* and 3.8 m<sup>3</sup>/tree (5426 m<sup>3</sup>/ha) in *Scuturător*. The sour cherry trees varieties, without a crown volume of 4000-45000 m<sup>3</sup>/ha, did not register significant fruit yields.

At forming and managing the palmetta with oblique branch crown shape, the crown modelling and maintenance of general principles, stipulated by Zahn (*Figure 1*) were observed.

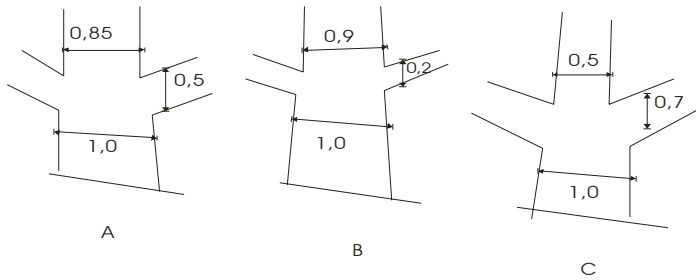
Because of limiting the extension of fruit tree height (2.5 m) and crown width to the interval between fruit tree rows (1.2-1.5 m) and of the modification of branch position by bending and nailing up toward the row direction, the space reserved to the tree by planting distances was occupied at a percentage of 74.7% and 107.5%.

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Table 1  
Crown volume and fruit-bearing formations, which prevailed in 16 sour cherry tree varieties

Variety	Tree vigour	Crown size			Predominant fruit bearing formations	Crown volume		Covering degree of fruit bearing hence (%)
		D (m)	d (m)	H (m)		m <sup>3</sup> /tree	m <sup>3</sup> /ha	
Erdi Nagygyümölcsű	Great	4.30	1.37	2.45	Bouquets	8.2 a	5855	107.5
Timpurii de Pitești	Great	4.10	1.50	2.35	Average branches, bouquets	7.6 a	5426	102.5
De Botoșani	Great	3.89	1.34	2.50	Average branches, bouquets	7.1 ab	5069	97.2
Timpuriu de Osoi	Great	3.99	1.45	2.40	Average branches, bouquets	7.4 ab	5284	99.7
Erdi Bötermő	Average	3.96	1.46	2.28	Average branches, bouquets	7.0 ab	4998	99.0
Pandy BBC	Average	3.26	1.40	2.35	Average branches, bouquets	5.3 b	3784	81.5
Ujfehértói fűrtös	Average	3.39	1.34	2.24	Average branches, bouquets	5.2 b	3713	84.7
Drobeta	Average	2.99	1.20	2.04	Average drooping branches	3.8 b	2713	74.7
Breznița	Average	3.20	1.26	2.17	Average drooping branches, bouquets	4.6 b	3284	80.0
Nana	Average	2.62	1.28	2.27	Drooping branches	3.7 a	5284	131.0
Ilva	Low	2.01	1.17	1.81	Drooping branches	2.6 ab	3713	100.5
Pitic	Low	2.23	1.01	1.83	Drooping branches	2.0 b	2856	111.5
Kelleris	Average	2.36	1.26	2.30	Average branches, bouquets	3.1 ab	4427	118.0
Meteor korai	Average	2.58	1.15	2.15	Bouquets	3.1 ab	4427	129.0
Scuturător	Average	2.67	1.35	2.30	Bouquets	3.8 a	5426	133.5
Țarina	Average	2.21	1.17	2.27	Bouquets	2.7 ab	3855	110.5

Planting distance 3.5 x 4 m  
3.5 x 2 m



**Figure 1 – Sizes of frame branches, axe and trunk**  
**A - optima values; B and C – lack of balance**

The phenological phases of fructification organs have shown great differences between sour cherry tree varieties.

Under conditions of the Iași zone, the sour cherry tree flowering took place generally, in the III<sup>rd</sup> decade of April. It has an average duration of 7-10 days (Table 2).

**Table 2**

**Phenological phases of fructification organs**  
**in 16 sour cherry tree varieties, during 2004 – 2005**

Variety	Flowering (limit dates)		Ripeness at harvest	No. of days from the end of flowering till harvesting
	Beginning	End		
Țarina	13.04-17.04	23.04-25.04	11.06-26.06	42-48
Nana	14.04-18.04	27.04-28.04	6.07	66-70
Pitic	21.04-28.04	7.05	25.06-1.08	71-76
Kelleris	16.04-20.04	30.04	30.06-2.07	55-57
Scuturător	14.04-18.04	24.04-28.04	30.06	61-65
Ilva	16.04-20.04	27.04-30.04	20.06-25.07	56-64
Meteor korai	13.04-17.04	25.04-26.04	11.06-28.06	40-43
De Botoșani	15.04-19.04	26.04-28.04	5.07-6.07	61-62
Erdi Bötermö	14.04-17.04	27.04-28.04	28.06-30.06	58-61
Erdi Nagygyümölcsü	14.04-19.04	24.04-28.04	10.06-26.06	43-51
Drobeta	13.04-17.04	26.04-27.04	10.06-1.07	40-43
Timpuriu de Pitești	13.04-17.04	24.04	10.06-18.06	40-44
Timpuriu de Osoi	13.04-17.04	23.04-25.04	10.06-26.06	40-42
Breznița	15.04-19.04	26.04-29.04	30.06-5.07	59-61
Ujfőhértói fűrtös	16.04-19.04	23.04-29.04	30.06-5.07	55-58
Pandy BBC	15.04-19.04	26.04-29.04	5.07-6.07	60-64

The following varieties have presented early flowering: *Țarina*, *Drobeta*, *Timpuriu de Pitești* and *Timpuriu de Osoi*. The varieties *Kelleris* and *Pitic de Iași* had a late flowering. The fruit ripening period began in the second decade of June with varieties: *Țarina*, *Meteor korai*, *Timpuriu de Pitești*, and *Timpuriu de Osoi*

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and ended in the third decade of July with varieties *Pandy BBC*, *Nana* and *Pitic de Iași*. The number of days from the end of flowering until harvesting has varied between 42-45 days in early varieties, 50-60 days in average varieties and over 60 days in late varieties.

The fruit yield obtained in years XVI-XVII since planting has differed according to variety and planting distance (*Table 3*). Analysing the average yield in the two studied years, we have noticed that the highest yields were registered in *Erdi Böttermö*, *De Botoșani*, *Erdi Nagygyümölcsü*, and *Ujféhértói fűrtösi*, being obtained distinctively significant differences of yields, compared to the control *Timpuriu de Osoi*, comprised between 4.18 and 5.57 t/ha.

**Table 3**  
**Fruit yield in 16 sour cherry tree varieties in years XVI-XVII since planting**

Variety	Fruit yield		Average yield		Difference to the control		Signif.
	2004	2005	2004-2005				
	Kg/tree	Kg/tree	Kg/tree	t/ha	Kg/tree	t/ha	
Erdi Böttermö	17.3	11.4	14.35	10.24	7.8	5.57	***
De Botoșani	16.1	9.6	12.85	9.17	6.3	4.50	***
Drobeta	8.5	6.7	7.6	5.43	1.05	0.74	
Erdi Nagygyümölcsü	16.5	11.8	14.15	10.10	7.6	5.43	***
Ujféhértói fűrtös	15.2	9.6	12.4	8.85	5.85	4.18	**
Pandy BBC	15.2	6.9	11.05	7.89	4.5	3.21	*
Breznița	9.0	7.5	8.25	5.89	1.7	1.21	
Timpuriu de Osoi (control)	8.1	5.0	6.55	4.68	0	0	
Timpurii de Pitești	7.2	3.9	5.55	3.96	-1.0	-0.71	
Planting distance 3.5 x4 m							
LSD 5 % =2.44		LSD 1% = 3.3		LSD 0.1% = 4.38 kg/tree			
Nana	15.5	8.9	12.2	17.42	2.5	3.57	**
Ilva	12.8	7.2	10.0	14.28	0.3	0.42	
Pitic (control)	12.7	6.7	9.7	13.85	0	0	
Kelleris	15.2	5.5	10.35	14.78	0.65	0.92	
Meteor korai	14.0	3.8	8.9	12.71	-0.8	-1.14	
Scuturător	9.2	1.5	5.35	7.64	-4.35	-6.21	000
Țarina	7.5	1.4	4.45	6.35	-5.25	-7.50	000
Planting distance 3.5 x 2 m							
LSD 5 % =2.44		LSD 1% = 3.3		LSD 0.1% = 4.38 kg/tree			

In the varieties with low-average vigour, the yields obtained were between 6.35 t/ha (*Țarina*) and 17.42 t/ha (*Nana*), with significant yield differences, compared to the control *Pitic de Iași*, of 3.57 t/ha in case of *Nana* variety. Generally, the yields obtained in sour cherry tree varieties with early ripeness of fruits, were lower, compared to the varieties with average and late ripeness period of fruits. The palmetta with oblique branch crown shape did not show good results in all studied varieties.

Table 4  
Physical and chemical fruit characteristics in 16 sour cherry tree varieties, during 2004-2005

Variety	Average weight of a fruit (g)	% Kernel	Ratio pulp/kernel	DM %	Reducing glucides %	Titration acidity % malic acid	C vitamin mg / 100 g	Ratio sugar/acidity
Tarina	5.2	6.5	14.3	14.7	10.36	1.67	10.07	6.02
Meteor korai	4.7	6.7	13.9	14.3	9.79	1.46	9.49	6.6
Timpurii de Osoi	5.3	10.5	8.5	11.7	8.14	1.46	6.88	
Timpurii de Pitești	5.3	10.7	8.3	12.5	9.07	1.57	9.66	
Erdi Naggyűmölcsű	6.3	8.9	10.2	11.2	8.38	1.33	8.50	6.3
Drobeta	4.3	9.7	9.3	12.2	8.54	1.50	7.85	
Erdi Böttermő	5.8	6.5	14.4	13.0	8.84	1.42	7.93	6.2
Scuturător	5.8	9.6	9.4	15.3	9.72	1.72		5.6
Nana	5.9	9.2	9.8	13.0	9.06	1.80		5.0
Ilva	5.3	9.3	9.7	14.7	6.28	1.80		3.5
Kelleris	4.7	8.0	11.5	13.0	9.17	1.46		6.2
Ujhéértői fűrtös	5.7	9.6	9.4	14.2	6.92	1.45	9.21	4.7
Breznița	6.2	9.2	9.8	13.5	9.15	1.89		4.8
De Botoșani	6.9	7.6	12.1	14.3	8.14	1.37	9.02	5.9
Pandy BBC	6.6	8.0	11.5	13.2	10.14	1.89	8.83	5.3
Pitic de Iași	4.4	8.6	10.6	10.7	9.70	1.97		4.9

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**Resistance at diseases.** Most of sour cherry tree varieties and hybrids had a good tolerance at *Coccomyces hiemalis*. The following varieties have shown a good resistance: *De Botoșani*, *Timpurii de Pitești*, *Timpuriu de Osoi* and *Breznița*.

**Fruit quality.** As concerns the fruit size, we noticed the following varieties *Erdi Bötermö*, *De Botoșani*, *Erdi Nagygyümölcsü* and *Pandy BBC*, where the average weight of a fruit has exceeded 6 g. The highest percentage of DM (14-16%) was registered by varieties *Țarina*, *Meteor korai*, *De Botoșani* and *Ujféhértói fűrtös*.

## CONCLUSIONS

By using the palmetta with oblique branch crown shape in sour cherry tree, one can obtain a crown volume over 5000 m<sup>3</sup>/ha, ensuring high fruit yields.

The lower productivity of some varieties is caused by unfavourable climatic conditions during flowering, especially in some self-sterile or partially self-fertile varieties.

The palmetta with oblique branch crown shape can be used in average vigour varieties, presenting greater ramification angles: *Erdi Bötermö*, *Drobeta*, *De Botoșani*, *Nana*, *Ujféhértói fűrtös* and *Meteor Korai*

## REFERENCES

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