STUDY ABOUT THE BEHAVIOUR OF SOME NEW SWEET CHERRY TREE CULTIVARS IN THE SOIL AND CLIMATE CONDITIONS BY N-E AREAS OF ROMANIA

STUDIUL COMPORTĂRII UNOR SOIURI NOI DE CIREŞ ÎN CONDIȚIILE PEDOCLIMATICE DIN N-E ȚĂRII

IUREA ELENA, PETRE L., SÎRBU SORINA
Research and Development Station for Fruit Tree Growing Iasi

Abstract. *For a new sweet cherry tree assortment with new cultivars which have all demandes and objectives, in 1990 was organised to Fruit Growing Development Station Iasi an experience with sweet cherry tree cultivars and hybrids elites. We have study five sweet cherry tree cultivars, through observations and determinations about trees vigor, the main fructification stages, self-fertility, behaviour about stress factors (frost, drought, special diseases), fruits yield and the main fruits physical and chemical features. Concerning the trees vigor, through trunk section surface, five new sweet cherry tree cultivars created at Fruit Growing Development Station Iasi, are classified in two vigor groupes: medium vigor cultivars, with trunk section surface between 376-296 cm^2 (as Cetatuia, Catalina, Maria and Marina cultivars) and small vigor cultivars, with trunk section surface with 274 cm^2 (as Golia cultivar). Concerning productivity level, all theses five cultivars have a very good productivity, remarkable though high yields by four years (Cetatuia have 14,4 tonnes/ha, Catalina with 12 tonnes/ha, Maria with 14,5 tonnes/ha and Marina with 16 tonnes/ha). The new sweet cherry cultivars have a very early maturity (Cetatuia), early maturity (Catalina), self-fertility (Maria), small vigor trees (Golia) and late maturity (Marina).*

Rezumat. *Pentru reînnoirea sortimentului de cireş cu noi soiuri care să întrunească toate cerințele şi obiectivele urmărite, în anul 1990 s-a organizat la SCDP Iaşi o experiență cu soiuri şi elite hibride de cireş. La cele cinci soiuri luate în studiu s-au efectuat observații şi determinări privind vigoarea pomilor, principalele fenofaze de fructificare, autofertilitatea, comportarea față de factorii limitativi ai producției (ger, secetă, bolile specifice cireşului), producția de fructe şi principalele însuşiri fizico-chimice ale fructelor. După vigoarea de creştere a pomilor, exprimată prin suprafața secțiunii trunchiului, cele cinci soiuri noi de cireş create la SCDP Iaşi, se împart în două grupe de vigoare: soiuri de vigoare mijlocie, cu suprafața secțiunii trunchiului între 376-296 cm^2, (Cetățuia, Cătălina, Maria şi Marina) şi soiuri de vigoare mică, cu suprafața secțiunii trunchiului 274 cm^2 , (Golia). Sub aspectul productivității, toate cele cinci soiuri au o capacitate productivă foarte bună, remarcându-se prin producțiile mari pe patru ani (Cetățuia cu 14,4 t/ha, Cătălina cu 12 t/ha, Maria cu 14,5 t/ha, Golia cu 11,2 t/ha şi Marina cu 16 t/ha). Soiurile noi de cireş s-au remarcat prin extratimpurietate (Cetățuia), timpurietate (Cătălina), autofertilitate (Maria), vigoare scăzută (Golia) şi tardivitate (Marina).*

The pedo-climatic conditions from the NE of the country are favourable for the cherry breeding except some years when some natural calamities occurred. The present and future situation of the cherry breeding as well as the results of the previous research

constituted stimulating factors to continue and deepen researches for the cherry species from this part of the country.

The goal of this study focuses on the improvement of the cherry assortment for the NE area of Romania by promoting the newly created breeds at SCDP Iaşi, the renewing of the present cherry assortment by new high quality breeds and especially the extension of the cherry season, the completion of the gaps existing in the period of consumption, the setting up of a special assortment for industrialization, and mentioning the areas where the respective breeds give the best results.

To renew the cherry assortment with new breeds that might meet all the requirements and objectives enumerated above, in 1990, they organized at SCDP Iaşi an experiment with 10 cherry breeds and hybrid elites.

MATERIAL AND METHOD

The studies were effectuated in the interval 2004 – 2007, having as research material five new cherry breeds created at SCDP Iaşi, homologated in 1999 – 2001 (Cetățuia, Cătălina, Maria, Golia and Marina), and as a blank test the breed Boambe de Cotnari clone 5, all of them grafted on mahaleb.

The comparative contest culture was placed linearly, in three groups of 3 trees at a distance of 5 x 4 m, and guided under the form of a free fan-shaped espalier without a supporting system.

During the experiment, the soil was maintained as a black land, the pests and diseases were fought against when we received warnings and the culture technology was the one specific to the cherry culture.

We made observations and measurements regarding the tree vigor (the surface of the trunk section, cm^2), the main pheno-phases of fructification, self-fertility, the behaviour towards the limitative factors of production (frost, drought, diseases specific to cherry trees), the fruit production and the principal physical-chemical features of fruits.

RESULTS AND DISCUSSIONS

The data regarding the tree vigor and the increase of the trunk surface measured in the autumn of 2007 have values close to the blank test Boambe de Cotnari cl. 5: Cetățuia with 376 cm^2, Maria with 343 cm^2, Cătălina with 299 cm^2 , Marina with 296 cm^2 and Golia with 274 cm^2 (*tab. 1*).

Analyzing the resistance of the breeds to anthracnose (*Coccomyces hiemalis Higg*.) we notice that the breed 'Golia' registered a degree of attack of 5%, the remainder of the breeds registering a degree of attack under 1% (0,12-0,72%) (*tab. 2*).

This aspect associated with the reduced degree of attack for aphides (0,07-5%), made us understand that if we apply 4-6 chemical treatments at optimum times we may insure an economic harvest volume with healthy trees throughout the year.

All the breeds under study manifested a good resistance to frost and drought thus they may be cultivated in harsher conditions than in the NE of Moldavia. It is significant that in the conditions of the winter of 2005-2006, when they registered minimum temperatures of –25° -27°C, the breeds under study did not show any damages provoked by frost.

Table 1

Dates concerning trees vigor until XVII year from plantation

Cultivar	Trunk section surface				
	cm^2		Calculated given the average		
	Annual growth of trunk	Trunk section surface 2007	%	Differen-ce (+) (-)	Signifi-cance
Cetățuia	18	376	119,7	62	
Maria	16	343	109,2	29	
X (Average)		314	100	0	
Cătălina	12	299	95,2	- 15	
Boambe de Cotnari (as control)	11	297	94,6	- 17	
Marina	17	296	94,2	- 18	
Golia	9	274	87,3	- 40	

DL 5% = 75,3 *DL 1% = 107,1* *DL 0,1% = 155,1*

Table 2

Resistance of five cultivars at production's damages factors

Cultivar	Resistance at:							
	Anthracnose:			Aphides:			Frost	Draught
	Attendances %	Inten-sity %	Attack degree F x I 100	Attendances %	Inten-sity %	Attack degree F x I 100		
Cetățuia	4	3	0,12	24	20	4,80	good	good
Cătălina	8	9	0,72	25	20	5,00	good	good
Maria	7	5	0,35	8	6	0,48	good	good
Golia	20	25	5,00	0	0	0,00	good	good
Marina	5	3	0,15	4	2	0,08	good	good
Boambe de Cotnari (as control)	27	24	6,48	32	27	8,64	medium	good

The pheno-phases of the fructification organs are specific to the biology of each species and the date of their start and duration depend on the climatic conditions of each year.

We also made observations on the unfolding of the main pheno-phases of fructification, and we noticed differences from one year to another depending on the climatic conditions (tab. 3).

The beginning of bud swelling out and blossoming started the earliest in 2007 and the latest in 2005.

Blossoming started the earliest on April 7th for the breed Cetățuia, and the latest fro the breeds Golia and Boambe de Cotnari on April 22nd.

In 2005, the early breeds suffered partially that were caught during blossoming by a temperature of –2° C, and in February 2007 from positive temperatures there occurred an abrupt going down of temperature (-20,7 C^{o}) producing huge loses for the early cherry trees (10-20%).

Table 3

Fructification stages to sweet cherry during 2004 – 2007

Fructification stages of	Cultivar:					
	Cetățuia	Cătălina	Maria	Golia	Marina	Boambe de Cotnari((as control)
Start of swollen bud	20.03-03.04	18.03-02.04	20.03-04.04	24.03-04.04	19.03-03.04	18.03-02.04
Start of bud burst	27.03-06.04	24.03-05.04	27.03-06.04	30.03-06.04	25.03-05.04	27.03-06.04
Start of blossom	07.04-17.04	08.04-19.04	09.04-20.04	11.04-22.04	12.04-20.04	11.04-22.04
End of blosson	18.04-25.04	18.04-26.04	19.04-27.04	20.04-28.04	24.04-27.04	19.04-27.04
Maturity	20.05-30.05	06.06-10.06	12.06-18.06	15.06-18.06	03.07-08.07	18.06-03.07
Days between end blossom and maturity	32-38	46-50	53-55	52-59	72-74	61-68
Self - fertility %	1,6	2,6	48	5,9	-	-

The time of fruit maturation was spaced out for 50 days starting with May 20th for the breed Cetățuia and finishing on July 8th for the breed Marina.

The breed Maria registered self-fertility in all years (48%), the other breeds registering percentages raging between 0-5,9%.

From the group of extra-early and early breeds, Cetățuia şi Cătălina are representative, and we highlight the larger production for Cetățuia (28,7 kg/tree, 14,4 t/ha respectively) as compared to Cătălina (24,0 kg/tree, 12 t/ha respectively).

Table 4

Fruits yield registered during 2004 - 2007

CULTIVAR	Yielo (Kg/tree) in years:				Average yielo:	
	2004	2005	2006	2007	Kg/tree	t/ha
Cetățuia	32,5	31,0	25,5	24,6	28,7	14,4
Cătălina	28,0	27,5	22,6	18,2	24,0	12,0
Maria	30,5	32,0	28,0	25,4	28,9	14,5
Golia	27,0	25,6	20,8	15,7	22,3	11,2
Marina	37,5	35,5	29,7	25,4	32,0	16,0

The group of breeds with average maturation is represented by the fruit production of the breed Maria (28,9 kg/tree, 14,5 t/ha respectively) as compared to the breed Golia (22,3 kg/tree, 11,2 t/ha respectively).

The largest fruit production was registered for the breed Marina (32,0 kg/tree, 16,0 t/ha respectively).

The evaluation of the physical-chemical features of the fruits of the five cherry breeds created at SCDP Iaşi, was analysed for a period of four years (2004-2007), for the fruit samples harvested at their full maturity from the contest culture existing on the experimental field (tab. 5).

Table 5

Physical and chemical features of fruits at five new sweet cherry cultivars

Physical-chemical features of fruit	CULTIVAR				
	Cetățuia	**Cătălina**	**Maria**	**Golia**	**Marina**
Average weight (g)	5,9-6,1	6,8-7,8	7,4-8,3	7,5-8,0	7,6-8,0
Shape	Kidney shape	Heart shape oblong	Heart shape oblong	Heart shape	Heart shape
Acidity (By tasting)	Small	Small	Small	Small	Medium
Taste (By tasting)	Sweet	Sweet	Sweet	Sweet	Sweet tart
Peduncle length	Medium	Long	Medium	Long	Long
Stone size	Medium	Medium	Medium	Medium	Big
Stone size/fruit weight ratio (%)	6,5	6,5	5,9	5,2	6,9
Dry substance (%)	16,0	16,0	17,0	17,5	16,8
Skin colour	Red blackish	Red blackish	Red blackish	Red blackish	Half red half yellow
Juice colour	Purple red	Red	Red	Purple red	White yellow
Pulp colour	Red	Red	Red	Red Blackish	White yellow
Pulp firmness	Semifirm	Semifirm	Firm	Firm	Firm
Suculence	Medium	Medium	Medium	Medium	Medium

The physical-chemical tests were effectuated on account of some parameters established by the UPOV testing guide.

Fruit size. From the five cherry breeds, four breeds have big and very big fruits (6,8-8,3 g the average weight of a fruit), only Cetățuia has average size fruits (5,9-6,1).

Fruit shape. It varies from reniform (Cetățuia) to cordiform (Golia and Maria) and cordiform elongated (Cătălina and Marina).

By tasting they appreciated the fruit acidity and taste. Most breeds have a small acidity (four breeds) and one has an average acidity.

The taste varied from sweet (Cetățuia, Cătălina, Maria, Golia) to acidulated sweet (Marina).

Stone size. As compared to the total weight of fruit stones were average (Cetățuia, Cătălina, Golia, Maria) and big (Marina).

The dry substance (%). The breeds under study had the following values: 16% early breeds (Cetățuia and Cătălina), 16,8% for the breed Marina, 17% Maria and 17,5% for the breed Golia.

Fruit colour. The red colour was dominant with shades from bright red (Maria) to dark red (Cetățuia, Cătălina and Golia). One single breed Marina had a bicolor shade (red and yellow).

Pulp colour. Most breeds had a red colour only the breed Marina had a white-yellowish pulp colour.

Pulp firmness varied from half-hard (Cetățuia and Cătălina) to hard (Maria, Golia and Marina).

The pulp succulence is average for all breeds.

CONCLUSIONS

1. According to the tree growing vigor expresses by the surface of the trunk section, the five new cherry breeds fall into two vigor groups: average vigor breeds with a surface of the trunk section between 296 - 376 cm2 (Cetățuia, Cătălina, Maria and Marina) and breeds with little vigor having a trunk section surface of 274 cm2 (Golia).
2. All the five breeds are good for intensive plantations.
3. In the climatic conditions of Iasi, the blooming of the cherry tree generally takes place in the second decade of April and has an average duration of 7-12 days and the maturation time of fruits starts at the beginning of the third decade of May for the breed Cetățuia and ends in the first decade of July for the breed Marina.
4. As for productivity, all the five breeds have a very good productive capacity standing out by their large productions for four years (Golia with 11,2 t/ha, Cătălina with 12 t/ha, Cetățuia with 14,4 t/ha, Maria with 14,5 t/ha and Marina with 16 t/ha) .
5. As for the fruit quality, all the five breeds show superior features in terms of size, colour, firmness, taste and contents of dry substance.
6. The new cherry breeds stood out for their extra-earliness (Cetățuia), earliness (Cătălina), self-fertility (Maria), little vigor (Golia) and tardiness (Marina).

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