

AGROBIOLOGIC POTENTIAL EVALUATION OF SOME NEW SWEET CHERRY VARIETIES IN ORDER TO IMPROVE UPON THE ROMANIAN ASSORTMENT

EVALUAREA POTENȚIALULUI AGROBIOLOGIC AL UNOR SOIURI NOI DE CIREȘ ÎN SCOPUL AMELIORĂRII SORTIMENTULUI DIN ROMANIA

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Abstract. *In Romania, Iasi area is one of the most favorable for growing cherries. Regarding the zonal assortment, it suffered constant renewal through continuous selection of local biotypes valuable and not least by introducing new varieties and rootstocks of cherry trees from abroad. The experiment was organized as an intensive cherry plantation. Biological material used consisted of five new foreign cherry varieties: 'Kordia', 'Karina', 'Regina', 'Summit', 'Sunburst', grafted on 'Gisella', vegetative rootstock. Cherry plantation was established in 2010 with planting distances of 4 x 2 m, resulting in a density of 1250 trees/ha. As a form of leadership trees crown was chosen Leader of the Central Vogel (VCL). New cherry varieties studied were noted by productivity and fruit quality: 'Kordia' 12.1 t/ha in the fourth year after planting (10.3 g fruit average weight), 'Regina' 10.2 t/ha, (10.6 g), 'Karina' 10.2 t/ha (9.7 g) and 'Summit' 10.0 t/ha (9.8 g)*

Key words: new varieties, sweet cherry, assortment, cultivation area

Rezumat. *În România, zona Iași, este una dintre cele mai favorabile pentru cultura cireșului. În ceea ce privește sortimentul zonal, acesta a suferit o permanentă înnoire, prin selecția continuă de biotipuri locale valoroase și nu în ultimul rând prin introducerea de noi soiuri și portaltoi din străinătate. Experiența a fost organizată într-o plantație intensivă de cireș. Materialul biologic folosit cinci soiuri noi de cireș străine: Kordia, Karina, Regina, Summit, Sunburst, altoite pe portaltoiul vegetativ Gisella 5. Plantația de cireș a fost înființată în anul 2010, cu distanțele de plantare de 4 x 2 m, rezultând o densitate de 1250 pomi/ha. Ca formă de conducere a coroanei pomilor s-a optat pentru Liderul Central Vogel (VCL). Dintre soiurile noi de cireș luate în studiu s-au remarcat prin productivitate și calitatea fructelor: Kordia 12,1 t/ha în anul VI de la plantare (10,3 g greutatea medie a fructului), Regina 10,2 t/ha, (10,6 g), Karina 10,2 t/ha, (9,7 g) și Summit 10,0 t/ha, (9,8 g)*

Cuvinte cheie: soiuri noi, sortiment, cireș, zona de cultură

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INTRODUCTION

Since the agricultural variety is the main mean of production, increasing the quantity and quality of the finished product is done by changing the variety and application upon him of the most suitable crop technologies that enhance the genetic potential and on the other hand to ensure the conservation and protection of natural ecological framework, namely the soil and environment. Each fruit-growing country cultivates its own range and it mainly consists of varieties well adapted to its own ecopedological conditions, fruit tree assortment adequate to specific growing areas.

Certainly, the most notable news obtained from breeders in Europe are early ripening varieties 'Primulat' and 'Early Bigi' (France), self-fertile 'Sweet Early' and 'Grace Star' (Italy), middle ripening 'Giorgia' (Italy) and 'Vera' (Hungary), medium-late 'Kordia', 'Vanda' and 'Techlovan' (Czech Republic) and 'Black Star' (Italy) and late ripening varieties 'Regina' (Denmark) and 'Alex' (Hungary) (Sansavini and Lugli, 2005).

In Romania, there is intense work on creating new varieties of trees, till present, corresponding to the general objectives such as different period of fruits ripening, comparing to the existing varieties, reduced vigor, self-fertility, high environmental adaptability, disease resistance, etc. In terms of assortment, it suffered constant renewal through continuous selection of local biotypes valuable and not least by introducing new varieties from abroad and new Romanian creations, obtained at Bistrita, Pitești and Iasi research stations (Balaci *et al.*, 2007; Budan *et al.*, 2007; Istrate *et al.*, 2008; Petre *et al.*, 2007).

The current study was conducted during 2015-2016 observing the production behavior of some new varieties of cherry grafted on Gisella 5 rootstock, in the climatic conditions of Iasi County.

MATERIAL AND METHOD

The experiment was organized as an intensive cherry plantation. Biological material consisted of five new foreign cherry varieties: 'Kordia', 'Karina', 'Queen', 'Summit', 'Sunburst', grafted on 'Gisella 5' vegetative rootstock.

Sweet cherry plantation was established in 2010 with planting distances of 4x2m, resulting in a density of 1250 trees/ha.

As a form of leadership trees crown was chosen Leader of the Central Vogel (VCL).

The soil maintenance method was grassing, combined with mechanized work of intervals between rows.

The orchard is provided with fertigation system and it is also protected with hail cannon.

During the growing season there are applied specific maintenance works. Pest and disease control is performed by applying 6 to 8 phytosanitary treatments.

RESULTS AND DISCUSSIONS

The main factors of the trees vigor evaluation were the growth of trunk sectional area and crown volume. Sectional area of the trunk at the studied cherry varieties, in the VI-th year after planting, recorded values between 34.19 cm² ('Karina') and 48.99 cm² ('Regina') (tab. 1). The highest increase growth in 2015 - 2016 period was registered by 'Regina' variety (14.8 cm²), followed by 'Sunburst' (11.31 cm²) and 'Karina' (11.31 cm²) that, evaluated as statistically significant differences compared with the control.

The smallest increase growth in the same period was recorded by 'Kordia' variety (7.91 cm²), with significant negative differences.

'Regina' variety (335.4 cm) recorded the highest values of trees height, followed by 'Kordia' (311.9 cm) and 'Summit' (309.0 cm) (tab. 1).

The longest annual increases (over 60 cm) were registered by 'Regina' and 'Kordia' varieties.

Table 1

Trunk section area, tree height and length of annual increases at some new cherry varieties

Variety	Trunk section area (cm ²)		Tree height (cm)		Length of annual increases (cm)	
	2015	2016	2015	2016	2015	2016
Regina	34.19	48.99	311.6	335.4	38.4	62.4
Kordia	27.32	35.23	294.8	311.9	27.6	60.3
Karina	24.61	34.19	291.6	308.4	18.3	45.6
Summit	30.17	39.57	287.6	309.0	22.1	47.5
Sunburst	28.26	39.57	278.6	295.5	31.8	57.8

Table 2

Tree vigor and crown volume at some new cherry varieties

Variety	Tree vigor	Crown volume		
		D (m)	D (m)	H (m)
Regina	Medium	2.35	2.49	3.22
Kordia	Medium	2.48	2.69	2.96
Karina	Little-medium	2.19	1.95	2.94
Summit	Medium	2.59	2.67	2.81
Sunburst	Little-medium	2.11	1.98	2.91

Knowing the biological particularities of the cherry varieties and hybrids, allows us to adopt differentiated culture technologies according to: the ecological area, trees vigor and fructification type, crown shape and planting distance.

In the sixth year after planting, 'Kordia' and 'Summit' varieties achieved the highest values of the crown volume 8.21 m³/tree (10261 m³/ha) and 8.08m³/tree (10100 m³/ha) (tab. 3).

The lowest crown volume was obtained by 'Sunburst' (5.06 m³/tree) and 'Karina' (5.0 m³/tree) varieties. Reduced distance between trees per row (2 m) is fully covered by trees crown at the most varieties, achieving a continuous orchard fence.

Table 3

Crown volume and fruit formations of some new cherry varieties

Variety	Fruit formations	Crown volume	
		m ³ /tree	m ³ /ha
Regina	branch bouquet	7.84	9800
Kordia	branch bouquet	8.21	10261
Karina	branch bouquet	5.0	6250
Summit	branch bouquet	8.08	10100
Sunburst	branch bouquet	5.06	6325



Fig. 1 Crown Vogel Central Leader (VLC)

<http://pmmg.org.ge/res/uploads/%E1%83%AE%E1%83%94.jpg>

Leading trees as Central Leader Vogel form was made as a result of trees scaffold leading and semi permanent branches trellising on the direction of the row (fig. 1).

Details on the way of fructification in cherry emphasize that all varieties predominantly fructify on May bouquet (tab. 3).

Fructification phenophases are specific to each specie biology and the starting date and duration are related to the climatic conditions of each year (tab. 4).

Data on fructification phenophases of some new cherry varieties

Variety	Early flowering	End of flowering	Flowering duration -days-	Fruit maturation	Nr. of days from flowering to harvest end
Regina	9-11.IV	17-20.IV	8-9	21-25.VI	65
Kordia	31 III- 4.IV	7-13.IV	8-9	6-10.VI	58
Karina	6-8.IV	14-17.IV	8-9	15-18. VI	61
Summit	2-6.IV	9-14.IV	7-8	9-12. VI	58
Sunburst	1-5.IV	7-13.IV	7-8	8-11. VI	57

The beginning of flowering at studied cherry cultivars during 2015-2016 was between 31st of March and 8th of April, and the end of blooming was between 7th and 20th of April (tab. 4). The earliest flowering was registered in 2015, and the latest in 2016.

Among the studied cherry varieties, 'Kordia' and 'Sunburst' showed an early flowering. 'Regina' and 'Karina' varieties showed blooming tardiness.

Flowering overlapped in all cherry varieties, providing favorable conditions for cross pollination.

For a proper pollination and fertilization process, are preferred moderate temperatures 15 - 17°C, which maintain the viability of the stigma and the pollen for a longer period of time and allow the flight of bees.

Fruitfulness precocity is a complex genetic trait that manifests itself by variety and has a practical significance, being a key criterion in the choice of varieties of cherry plantations and current super-intensive type.

Fruit production obtained depends on the fertility of variety, the interaction between variety, biotope conditions and applied crop technology. As the biotope conditions are closer to the biological requirements of the variety, the production level increases.

The average yields for the years V-th and VI-th after planting, at studied cherry varieties, were between 9.2 t/ha ('Sunburst') and 12.1 t/ha ('Kordia') (tab. 5).

Table 5

Fruit production obtained at some new cherry varieties

Variety	The production of fruit obtained during 2015-2016		Fruit average weight (g)	S.U. (%)	Fruits skin color
	Kg/tree	t/ha			
Regina	7.6-8.1	9.5-10.2	10.6	15.8	Brown-red
Kordia	8.9-9.6	11.2-12.1	10.3	14.4	Brown-red
Karina	7.7-8.1	9.7-10.2	9.5	14.9	Brown-red
Summit	7.8-8.0	9.8-10.0	9.2	15.3	Dark red
Sunburst	7.3-7.9	9.2-9.9	9.4	16.2	Dark red

In terms of productivity, it was noticed 'Kordia' variety (11.5 t/ha) by 2-year average yields.

Trees leadership as Vogel Central Leader in cherry has good results at medium vigor varieties that have reduced capacity of branching.

Fruit size is a genetic trait of the variety, which can manifest differences at the same variety, depending on the climatic conditions, production quantity, soil fertility etc.

Regarding fruit size, among the studied cherry varieties, were noted 'Regina' (10.6 g fruit average weight) and 'Kordia' (10.3 g) (tab. 5).

The chemical composition of the fruit was determined in each year of the experiment, at the most varieties, focusing on the elements that are most important for cherries (tab. 5).

Highest soluble solids content was recorded at 'Sunburst' (16.2%) and 'Regina' varieties (15.8%).

CONCLUSIONS

- Climatic conditions of Serbesti area, Iasi County are favorable for growing cherry and may be enhanced by providing crop irrigation.
- Tree crown volume is very much influenced by the shape of the crown taken in conjunction with the varieties fructification type; planting distances and agricultural technique there were applied.
- 'Kordia', 'Summit' and 'Regina' cherry varieties, registered, in terms of planting distances of 4 x 2 m, a growth in volume, VI-th year after planting, of over 9800 cubic meters/ha, which explains the increased production obtained.
- In terms of productivity, stood by the average yields of 2 consecutive years (V-th and VI-th year after planting) the varieties: 'Kordia' (11.5 t/ha), 'Regina' (9.8 t/ha) and 'Karina' (9.7 t/ha).

REFERENCES

1. Balaci Raveca, Zagrai I., Platon I., Zagrai Luminița, Feștilă Angela, 2007 - *Evaluarea potențialului productiv și calitativ al unor soiuri de cireș în condițiile pedoclimatice ale zonei Bistrița*. Buletin Documentar Informativ nr. 28, al S.R.H.
2. Budan S., Petre L., Gradinariu G., 2007 - *Evaluation of some native sweet cherry genotypes collected ex situ into Romanian national germplasm*. Proceedings of the 12th Eucarpia Symposium on Fruit Breeding and Genetics, Zaragoza, Spain, Acta Horticulturae 2009 No.814(VOL 1) pp.157-160 ref.4.
3. Istrate M., Gradinariu G., Budan S., Petre L., Balaci R., 2008 - *Agro biological potential evaluation of some new cherry varieties and hybrids in order to ameliorate Romanian assortment*, ESNA XXXVIII Annual Meeting Krakow – Poland, Book of Abstracts, ISBN 83-60127-99-9, p 239.
4. Petre L., Sîrbu Sorina, Iurea Elena, 2007 - *Însușirile fizice, chimice și tehnologice ale fructelor la soiurile și elitele hibride de cireș create la S.C.D. P. Iași*. Lucrările științifice ale USAMV Iași, seria Horticultură, vol. 50. ISSN 1454-7376, p. 395-400.
5. Sansavini S., Lugli S., 2005 - *Sweet cherry breeding programs & new varieties released in Europe and Asia*. 5 th International Cherry Symposium Bursa, Turkey. Acta Hortic 410:51–64.