

Cultivar structure of sweet cherry plantations in Bulgaria

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Abstract

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In the current article, an overview of the main sweet cherry cultivars grown in our country was made. Dynamic of cultivar structure is determined on characteristics like size of fruit and yield, blooming and ripening periods and different resistance to diseases and cold resistance.

Advantages and disadvantages of the cultivars were analyzed – ‘Bigarreau Burlat’, ‘Early Lory’, ‘Kossara’, ‘Bing’, ‘Summit’, ‘Sunburst’, ‘Van’, ‘Kordia’ and ‘Regina’.

Key words: sweet cherry, cultivars, ‘Bigarreau Burlat’, ‘Summit’, ‘Kordia’

Introduction

Sweet cherry is a valuable fruit species, of great importance for the country, the biological and economic qualities, and allows it to occupy the second place in terms of area after the walnut of the fruit species in our country.

The cultivar structure of the sweet cherry in Bulgaria varies. In the period before the Second World War until the end of the 1960s, the cultivars ‘Ryzhdavichka belvitsa’, ‘Napoleon’, ‘May 11’, ‘Drogan’s yellow’, ‘Starozagorska edra’, ‘Plovdivska edra’, ‘Kuklenska belvitsa’, etc. were grown (Dzhuvinov et al., 2006).

In 1971 the cultivar structure of sweet cherry plantations were represented mainly by ‘Ranna cherna edra’ (19.9%), ‘Hedelfingen’ (19.3%), ‘Napoleon’ (18%), ‘Drogan’s yellow’ (10%), ‘Bing’ (3.1%), ‘Lambert’ (1%), other cultivars (28.7%), (Dzhuvinov et al., 2006).

Since the 1980s, the cultivars ‘Van’, ‘Bing’, ‘Lambert’, ‘Bigarreau Moreau’, ‘Bigarreau

Burlat’, ‘Ranna cherna edra’, ‘Germersdorf’, ‘Kozerska’, ‘Stella’ etc. were planted (Borovinova et al., 2008).

According to the Ministry of Agriculture, Food and Forestry, Department ‘Agrostatistics’ for 2002, the cultivar structure of sweet cherry in Bulgaria is represented by ‘Ranna cherna edra’ (22%), ‘Van’ (18%), ‘Bing’ (12%) and other cultivars (48%), but in 2017 is represented by ‘Van’ (33.3%), ‘Bing’ (16.2%), ‘Bigarreau Burlat’ (8.9%), ‘Kozerska’ (4.5%), ‘Bulgarska hrushtyalka’ (2.8%) and other cultivars (34.3%).

According to Regulation No. 9/26.03.2002 issued by MAF in State Gazette no.42/24.04.2002 the minimum requirements for sweet cherry fruits are: to be whole, healthy, fresh, with no visible impurities and pests, with handles, with a good degree of ripeness. Dimensions according to the diameter of the largest cross-section: for EXTRAS class - not less than 20 mm; for Class I and II - not less than 17 mm. For export, sweet cherries with an average weight of about 9-10 g or a diameter

of 24 to 28 mm are preferred (Dzhuvinov et al., 2006).

In order to increase efficiency new and introduced cultivars have to be introduced into production. Recently, a trend has been observed in the application of high-yielding cultivars and modern fertilization technologies, resulting in higher and higher yields (Bujdosó & Hrotkó 2019; Donoso et al., 2019; Dzhuvinov & Gandev, 2016; Dzhuvinov et al., 2014; Georgiev et al., 2007; Lang, 2019; Radunić et al., 2014).

The purpose of this study is to investigate the cultivar structure of sweet cherry (*Prunus avium* L.) in Bulgaria, to highlight the advantages and disadvantages of the analyzed cultivars.

Material and Methods

An in-depth analysis of sweet cherry cultivars grown in Bulgaria was made.

Documents and literary, agrobiological and technological sources have been researched to give more complete information on the cultivars structure of the sweet cherry tree grown in Bulgaria.

A parallel is made between the studied cultivars, being presented the most suitable for our country depending on their biological and economic qualities.

The experiment was created in the spring of 2011 on the area of Granitsa village, Kyustendil region on leached-cinnamon forest soil at planting distances 5 x 5 m, maintained as black fallow. The cultivars 'Bigarreau Burlat', 'Early Lory', 'Kossara', 'Bing', 'Summit', 'Sunburst', 'Van', 'Kordia' and 'Regina' grafted on a mahaleb rootstock formed as freely growing crown were investigated. Yield per tree, average weight of fruits were studied during the period 2016-2018.

Methods for the investigation of plant resources in fruit plants were used (Nedev et al., 1979), updated with UPOV indicators (2006).

Results and Discussion

'Bigarreau Burlat'

French cultivar, seedlings found in the depart-

ment of Rhone, France. Introduced in Bulgaria in 1968 by Vasil Georgiev

Tree is moderate to vigorous. The crown is wide pyramidal to pyramidal, medium dense. Flowering is moderately early (Fig. 1). The cultivar is cross-incompatible with Bigarreau Moreau. Good pollinators are 'Hedelfingen', 'Ranna cherna edra', 'Bing', 'Napoleon', 'Early Lory', etc. Starts early fruting. Good yielding, according to our data about 9 200 kg/ha. Fruits ripen at the end of May (Fig. 2). They are medium to very large (7.4 g), broadly cordate. The skin is thin, red, shiny (Table 1). Fruit flesh is pink-red, firm, sweet, slightly sour, slightly aromatic, with excellent taste. The stone is medium-sized, circular, flat, separable.

The cultivar is transportable. It is adapted for mechanized harvesting.

Unsatisfactory cold resistance. It is demanding to soil. A lot of fruits crack in wet weather.

'Early Lory'

French cultivar, synonyms 'Earlise' and 'Rivedel'. Created by Pierre Argot in 1997 by crossing of 'Starking' and 'Burla'. Cultivar record with the name 'Rivedel' since 1995. New for the country.

The tree is moderate growing. Flowering is early (Fig. 1). The cultivar is self-sterile. Good pollinators are 'Bigarreau Burlat', 'Skeena', 'Ferovia', 'Lory Bloom' etc. It ripen mid to late May, about 5-7 days before 'Bigarreau Burlat' (Fig. 2). The duration of ripening is 3-4 days. It enters early yielding and has a very good and regular yield gives 9 600 kg/ha.

Fruits are very large (9.3 g), reniform. Fruit skin is thick, with a dark red color (Table 1). Fruit is medium firm, juicy, with a sweet taste. Medium separable stone from fruit. The fruits are moderately transportable and storable.

Resistant to low temperatures. Sensitive to cracking of the fruit.

'Kossara'

Bulgarian cultivar obtained from the parental combination of 'Ranna cherna' x 'Bigarreau Burlat' by the method of embryo culture under in vitro conditions by Prof. Argir Zhivondov Institute of Fruit Growing, Plovdiv (Zhivondov

& Gercheva 2009).

The tree is moderate growing, with a medium dense crown. Flowering is early (Fig. 1). Good pollinators are 'Rivan', 'Nalina' and 'Bigarreau Burlat'. Ripens in early, in the middle of May (Fig. 2). In terms of our experience yields are 9 600 kg/ha.

The fruits are very large (7.8 g), cordate, with thin skin, dark red, glossy (Table 1). Fruit is red, juicy, soft, with a sweet and sour taste. The juice is purple. The stone is medium-sized, semi-separable.

Fruits are mainly suitable for fresh consumption.

Moderately resistant to low winter temperatures and turning spring frosts. Resistant to the leaf spots.

'Bing'

American cultivar, seed of Black Republican, introduced in Bulgaria in 1958.

The tree is weak to moderate growing, with a broad pyramid crown. Flowering is semi-late (Fig. 1). It pollinates with 'Van' and 'Rainier'. The cultivar is intersterile with 'Lambert', 'Compact Lambert', 'Emperor Francis' and 'Napoleon'. The fruits ripen in mid-June (Fig. 2). They are large to very large (7.1 g), cordate, slightly angular in shape (Table 1). The skin is hard, dark red to black red, glossy. Fruit flesh is firm, crispy, moderate juicy, light red and darker red around the stone, sweet-sour, with dark red juice. The quality is very good. The stone is medium, semi-separable.

Yielded cultivar (10 400 kg/ha) but not sufficiently cold-resistant. Transportable. It is suitable for mechanized harvesting and growing as a cherry hedge. In wet weather, fruits cracked a lot. They are suitable for fresh consumption and for processing.

'Summit'

Canadian cultivar originated from the crossing of 'Van' x 'Sam'. It was recognized for cultivar in 1973 in Agriculture Canada, Research Station, Summerland, British Columbia.

The tree has a strong growth and spread crown. Flowering is late (Fig. 1). Good pollinators are 'Royalton™', 'Emperor Francis', 'Bing', 'Lambert', 'Van', 'Salmo' etc. Ripening is late, mid to

the end of June (Fig. 2). Very good yielding.

Fruits are large (13 g). The shape is cordate, the skin is thick, dark red, glossy (Table 1). Fruit is very dense, with a nice sweet and sour taste, very good to excellent quality. Fruits are suitable for fresh consumption.

Yield is 13 600 kg/ha.

Resistant to low winter temperatures. Slightly sensitive to cracking. Sensitive to brown rot.

'Sunburst'

Canadian cultivar obtained from the crossing of 'Van' x 'Stella'. It was recognized for cultivar in 1971 in Agriculture Canada, Research Station, Summerland, British Columbia. In 1985 was introduced to our country.

The tree has moderate to strong growth and forms a globular, medium dense crown. Flowering is late (Fig. 1). Early in fruiting and having a very good and regular fertility. The cultivar is self-fertile and a universal pollinator.

Fruits mature late, in the second ten of June (Fig. 2). They are very large (9 g), with a reniform shape. Fruit is red, crispy, juicy, sweet-sour, with red wine-colored juice, shiny and very good quality. 12 800 kg/ha was obtained (Table 1).

They tolerate good manipulation and transport. They are suitable for fresh consumption and processing.

In wet weather, fruit has a medium sensitivity to cracking. Cultivar is characterized by very large fruits and very high yields.

'Van'

Canadian cultivar obtained from free pollination of 'Empress Eugenie' in 1944. It was imported to our country in 1968.

Tree is moderately strong, with a wide pyramid, medium dense crown. Flowering is late (Fig. 1). It pollinates with 'Bing', 'Napoleon' and 'Rainier'. Forms an intersterile group with 'Venus', 'Windsor' and 'Merton Bugarreau'. In the middle until the end of June (Fig. 2). Yielding is very good (12 400 kg/ha).

The fruits are large (7.3 g), reniform, dark red. The skin is thick, dark red, glossy (Table 1). Fruit is crispy, sweet, slightly sour, juicy, with very good to excellent qualities.

Fruits are suitable for mechanized harvest-

ing.

Cold resistance is good to fruit buds and laterals. It is highly sensitive to cylindrosporosis and is sensitive to virus disease “little cherry”, in which the fruits remain very small and lose much of their appearance and taste. It should be grown in typical cherry areas with sufficiently moist soils.

‘Kordia’- synonym ‘Attika’, a Czech cultivar, a bud mutation of the ‘Techlovicka’ cultivar, was introduced in 1982.

The tree is vigorous, with a broadly rounded crown. Flowering is relatively late (Fig. 1). It is pollinated by ‘Van’, ‘Hedelfingen’, ‘Regina’, ‘Star’, ‘Sam’. Late ripening of fruits (Fig. 2). Early comes into fruiting and has a very good yielding (12 400 kg/ha).

The fruits are very large (11 g), circular, brown-red with a black hue, firm, crispy, with very good taste (Table 1). The skin is dark red to brown-violet, glossy. Fruit is dark red, firm, juicy, sweet-sour, aromatic, with very good qualities.

Suitable for fresh consumption and processing. In wet weather, cracks are mild to moderate. They

can be picked and mechanized. Good for manipulation and transport. They are suitable for fresh consumption and compotes. Low frost resistance (flower buds are sensitive to spring frost).

‘Regina’

German cultivar obtained from the crossing of ‘Schneider’s’ and ‘Rube’, obtained by the Jork Institute in Hamburg in 1981.

The tree is moderate to a vigorous, medium dense crown. Flowering is late (Fig.1). The cultivar is self-sterile. It is pollinated by ‘Sylvia’, ‘Karina’, ‘Kordia’, ‘Sam’, ‘Hedelfingen’, ‘Stardust’. Late ripening of fruits (fig. 2). Early and regular yielding (12 800 kg/ha).

The fruits are very large (8.3 g), circular, with dark brown skin, red, firm, juicy, sweet, slightly sour, aromatic, with very good to excellent quality (Table 1).

When harvest is delayed, the fruit is kept on the tree without deteriorating the quality. In wet weather they crack very poorly. Good for manipulation and transport. Fruits are mainly used for fresh consumption, but can also be processed.

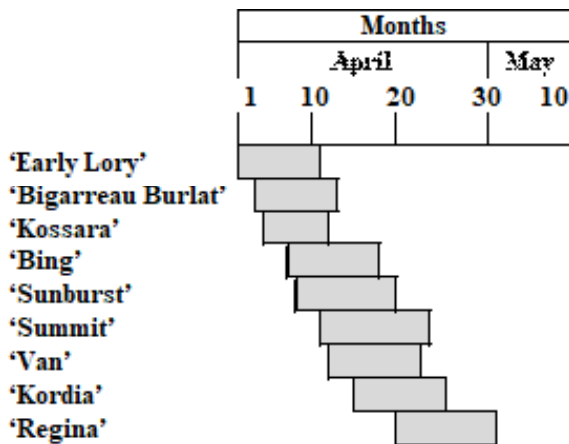


Fig. 1. Phenogram of flowering of sweet cherry (2016-2018)

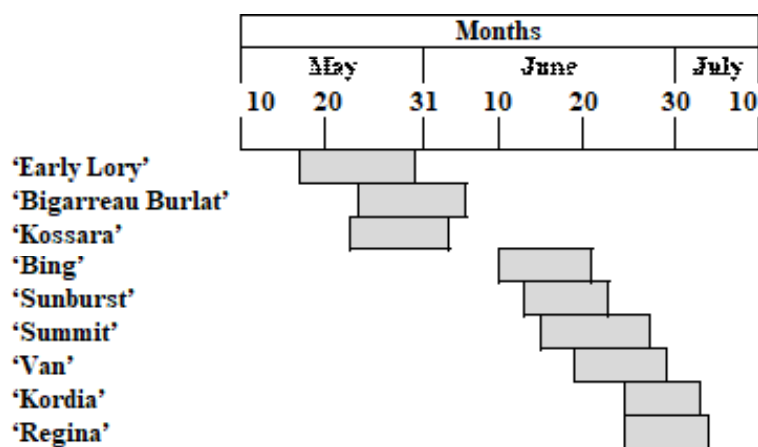


Fig. 2. Phenogram of ripening of sweet cherry fruit (2016-2018)

Table 1. Indicators characterizing phenological observations and the quality of sweet cherry fruit (2016-2018)

Cultivar	Fruit						Pollina-tors	Inter-sterile groups	Yields kg/ha
	Mean mass (g)	Shape	Skin color	Color of fruit flesh	Firmness of fruit flesh	Taste			
'Bigarreau Burlat'	7.4	broadly cordate	red	pink-red	firm	sweet, slightly sour	Hedelfingen, Ranna cherna edra, Bing, Napoleon, Early Lory, etc	Bigarreau Moreau	9 200
'Early Lory'	9.3	reniform	dark red	red	medium	sweet	Bigarreau Burlat, Skeena, Ferovia, Lory Bloom etc.	self-sterile	9 600
'Kossara'	7.8	cordate	dark red	red	soft	sweet-sour	Rivan, Nalina and Bugarreau Burlat		9 600
'Bing'	7.1	cordate	dark red to black red	light red to darker red	firm	sweet-sour	Van and Rainier	Lambert, Compact Lambert, Emperor Francis and Napoleon	10 400

Table 1. Continue

'Summit'	13	cordate	dark red	dark red	firm	sweet-sour	pollinators are Royalton™, Emperor Francis, Bing, Lambert, Van, Salmo etc		13 600
'Sunburst'	9	reniform	red	red	firm	sweet-sour	self-fertile, universal pollinator		12 800
'Van'	7.3	reniform	dark red,	dark red	firm	sweet, slightly sour	Bing, Napoleon and Rainier	Venus, Windsor and Merton Bugareau	12 400
'Kordia'	11	circular	brown-red	dark red to brown-violet	firm	sweet-sour	Van, Hedelfingen, Regina, Star, Sam		12 400
'Regina'	8.3	circular	dark brown	red	firm	sweet, slightly sour	self-sterile Sylvania, Karina, Kordia, Sam, Hedelfingen, Stardust		12 800

Conclusions

Fruit of investigated cultivars suitable for direct consumption and processing are 'Bing', 'Sunburst', 'Kordia' and 'Regina' and those of 'Kossara' and 'Summit' are suitable for fresh consumption.

Fruit mass vary and the largest fruit is characterized by the cultivar 'Summit' (13 g), followed by 'Kordia' (11 g), 'Early Lory' (9.3 g), 'Sunburst' (9 g), 'Regina' (8.3 g), 'Kossara' (7.8 g), 'Bigarreau Burlat' (7.4 g), 'Van' (7.3 g) and the smallest

fruit - 'Bing' (7.1 g).

According to the yields, cultivars arranged in descending order - 'Summit' (13 600 kg/ha), 'Regina' and 'Sunburst' (12 800 kg/ha), 'Kordia' and 'Van' (12 400 kg/ha), 'Bing' (10 400 kg/ha), 'Early Lory' and 'Kossara' (9 600 kg/ha) and 'Bigarreau Burlat' (9 200 kg/ha).

Suitable for mechanized harvesting are cultivars 'Bigarreau Burlat', 'Bing', 'Van' and 'Kordia'. On wet weather a lot of the fruits of cultivars cracked 'Bigarreau Burlat', 'Bing', 'Sunburst' and 'Kordia' are cracked, while 'Regina' and

‘Summit’ a little.

Good resistance to low winter temperatures has ‘Early Lory’, ‘Kossara’, ‘Summit’ and ‘Van’, while with ‘Bigarreau Burlat’, ‘Bing’ and ‘Kordia’ is unsatisfactory.

‘Kossara’ is resistant to leaf spot, while ‘Summit’ is sensitive to brown rot.

Variety ‘Van’ is susceptible to cylindrosporiasis and virus disease “Little cherry”.

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