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EVALUATION OF SWEET CHERRY CULTIVARS RECENTLY INTRODUCED INTO BULGARIA COMPARED WITH TWO BULGARIAN CULTIVARS

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A B S T R A C T

From 1998 to 2003, eight sweet cherry varieties were evaluated in terms of vigor, productivity and fruit weight. The varieties tested were: 'Celeste', 'Vanspur', 'Lapins', 'Kordia', 'Regina', 13-S27-17, 'Bigarreau Burlat' and 'Van'.

'Celeste', 'Vanspur', 'Lapins', 'Kordia' and 'Regina' are recently introduced foreign cultivars. 13-S27-17 is a hybrid developed at the Summerland Experimental Station in Canada. 'Bigarreau Burlat' and 'Van' are cultivars commonly grown in Bulgaria.

Six or seven trees of each variety, grafted on P1 (*Prunus mahaleb* seedling) rootstock, were planted 4.5 x 6.0 meters apart. Each tree was trained with a central leader and a free-growing crown. Gravity irrigation was employed.

Growth in 'Kordia' and 'Regina' was vigorous, and growth in the other varieties was moderate or moderate-to-vigorous.

The most precocious variety was 'Vanspur'.

The most productive variety was 'Van', followed by 'Vanspur', 13-S27-17, 'Kordia', 'Lapins', 'Celeste', 'Bigarreau Burlat' and 'Regina'.

'Regina' blossomed very late. In 2003, 'Regina' blossomed very rapidly under adverse weather conditions. The air temperature was over 25°C, which reduced blossom and fruit set.

The varieties with the largest fruits were 'Regina' and 'Celeste'.

The variety most susceptible to fruit skin cracking was 13-S27-17.

Key words: sweet cherries, cultivars,vigor, yield, productivity

INTRODUCTION

Many researchers work exclusively on expanding the selection of cultivars available to growers. They evaluate recently introduced foreign

cultivars in terms of their economic potential. Programs to improve the selection of sweet cherry cultivars are underway in many countries, including Bulgaria (Balmer, 2000; Nikolic et al., 1993; Christov, 2000; Zhivondov and Manolova, 2003).

In the last fifteen to twenty years, new, highly productive, large-fruited sweet cherry cultivars have been developed. Some of them are self-pollinated (Kappel and Lane, 1998; Stehr, 1997). In 1996, we introduced some relatively new sweet cherry cultivars into Bulgaria. The aim of this study was to evaluate vigor, productivity and fruit weight in six of these varieties, as well as in two Bulgarian cultivars.

MATERIAL AND METHODS

From 1998 to 2003, eight sweet cherry cultivars were evaluated in terms of vigor, productivity and fruit weight. The cultivars tested were: 'Celeste', 'Vanspur', 'Lapins', 'Kordia', 'Regina', 13-S27-17, 'Bigarreau Burlat' and 'Van'.

'Celeste', 'Vanspur', 'Lapins', 'Kordia' and 'Regina' are recently introduced foreign cultivars. 13-S27-17 is a hybrid developed at the Summerland Experiment Station in Canada. 'Bigarreau Burlat' and 'Van' are cultivars commonly grown in Bulgaria.

All cultivars were grafted on P1 rootstock. P1 rootstock is a selected *Prunus mahaleb* seedling rootstock which is recognized as the standard in Bulgaria. The trial was carried out near Plovdiv, Bulgaria. In March 1998, six or seven trees of each variety were planted in a random block design 4.5 x 6.0 meters apart. Trees were pruned only at planting. Each tree was trained with a central leader and a free-growing crown. The orchard soil surface was maintained as clear fallow. Gravity irrigation was employed.

RESULTS

There were no large differences between the varieties in terms of growth characteristics. Growth in 'Kordia' and 'Regina' was vigorous. Growth of 'Celeste', 'Lapins', 13-S27-17, 'Vanspur' and 'Bigarreau Burlat' was moderate-to-vigorous. Growth of 'Van' was moderate (Tab. 1).

In terms of blossoming time, the varieties fell into two groups. 'Bigarreau Burlat', 'Celeste', 'Lapins', 'Van' and 'Vanspur' blossomed relative early. The other varieties blossomed relatively late. 'Kordia' not only blossomed late, but also had a long blossoming period. 'Regina' blossomed very late.

The variety which ripened the earliest was 'Bigarreau Burlat', followed by 'Celeste', which ripened eight to eleven days later. The other varieties ripened later, and there were no large differences in their ripening times. 'Regina' ripened latest of all. Late ripening is considered a desirable trait.

Table 1. Growth characteristics of sweet cherry varieties in 2003, six years after planting

Cultivar	Tree height [cm]	Crown diameter [cm]	Crown volume [m^3]	Trunk diameter [cm]
'Celeste'	454	356	13.2	17.5
'Vanspur'	440	375	13.7	17.3
'Lapins'	476	338	12.2	16.7
'Kordia'	469	375	14.7	23.6
'Regina'	451	363	13.7	19.3
13-S27-17	456	318	10.2	11.4
'Bigarreau Burlat'	450	355	13.3	18.0
'Van'	405	287	8.0	10.1
GD 5%	44.63	70.39	5.40	5.53

Table 2. Yearly and three-year cumulative yields in eight sweet cherry varieties

Cultivar	Yield in 2001 [kg]	Yield in 2002 [kg]	Yield in 2003 [kg]	Three-year cumulative yield [kg]
'Celeste'	0.9	13.3	15.5	29.7
'Vanspur'	5.2	9.0	55.2	69.5
'Lapins'	1.4	10.6	33.5	45.5
'Kordia'	1.0	13.8	49.0	63.8
'Regina'	1.5	13.0	5.0	19.5
13-S27-17	1.1	11.5	35.8	48.4
'Bigarreau Burlat'	0.4	5.1	13.7	19.2
'Van'	1.2	9.8	31.8	42.8
GD 5%	1.64	3.32	13.66	16.35

Yearly yields from 2001 to 2003 for each variety are presented in Table 2, together with the three-year cumulative yields.

The most precocious variety was 'Vanspur', which had by far the highest yield of all varieties in 2001.

In 2002, the variety which had the highest yield was 'Kordia', and the variety with by far the lowest yield was 'Bigarreau Burlat'.

In 2003, the variety which had the highest yield was 'Vanspur', and the variety with by far the lowest yield was 'Regina'. All varieties except 'Regina' had higher yields in 2003 than in 2002. In 2003, 'Regina' blossomed very rapidly under adverse weather conditions. The air temperature was over 25°C, which reduced blossom and fruit set. This is also why 'Regina' had such a low three-year cumulative yield.

The varieties which had the highest three-year cumulative yields were 'Vanspur' and 'Kordia'. The varieties with the lowest three-year cumulative yields were 'Bigarreau Burlat' and 'Regina'.

Cumulative yield is not a reliable gauge of productivity because the varieties had different growth vigors. Productivity is better reflected by the

coefficients of productivity, in which cumulative yield is divided trunk cross-sectional area, crown area, and crown volume. The most productive variety was ‘Van’, followed by ‘Vanspur’, 13-S27-17, ‘Kordia’, ‘Lapins’, ‘Celeste’, ‘Bigarreau Burlat’ and ‘Regina’ (Tab. 3).

Table 3. Productivity coefficients in eight sweet cherry varieties in 2003, six years after planting

Cultivar	Cumulative yield divided by trunk cross-sectional area [kg/cm^2]	Cumulative yield divided by crown area [kg/m^2]	Cumulative yield divided by crown volume [kg/m^3]
‘Celeste’	0.17	2.98	2.26
‘Vanspur’	0.40	6.29	5.08
‘Lapins’	0.27	5.10	3.74
‘Kordia’	0.27	5.78	4.35
‘Regina’	0.10	1.89	1.42
13-S27-17	0.42	6.13	4.75
‘Bigarreau Burlat’	0.11	1.95	1.45
‘Van’	0.42	6.67	5.32
GD 5%	0.09	1.20	0.93

Table 4. Yearly and three-year average fruit weight in eight sweet cherry varieties

Cultivar	Fruit weight 2001 [g]	Fruit weight 2002 [g]	Fruit weight 2003 [g]	Three-year average [g]
‘Celeste’	10.6	9.7	9.4	9.9
‘Vanspur’	9.1	6.8	6.0	7.3
‘Lapins’	9.1	7.3	6.5	7.6
‘Kordia’	9.6	7.1	6.2	7.7
‘Regina’	10.5	9.8	9.8	10.0
13-S27-17	8.9	7.2	6.7	7.6
‘Bigarreau Burlat’	8.7	8.5	8.1	8.4
‘Van’	9.2	7.1	6.6	7.6
GD 5%	0.67	0.29	0.42	0.70

All of the varieties tested had their highest fruit weights in 2001, and their lowest fruit weights in 2003. Very young trees sweet cherry trees normally have high fruit weights when they are very young. The varieties with the highest three-year average fruit weights were ‘Regina’ and ‘Celeste’ (Tab. 4). Regina had such a high three-year average fruit weight probably because of the adverse weather conditions when it was blossoming in 2003. ‘Celeste’, on the other hand, had such a high three-year average fruit weight probably because of its genetic make-up.

The variety most susceptible to fruit skin cracking was 13-S27-17.

DISCUSSION

Based on the results of this trial, the most promising varieties are 'Celeste', 'Vanspur', 'Lapins' and 'Kordia'. 'Celeste' ripens at a good time and has very large, attractive fruits with fine skin flecks. 'Vanspur' is very productive and very precocious. 'Lapins' and 'Kordia' are relatively productive. 'Kordia' also has a long blossoming period. 'Regina' bears large fruits very late in the season, but it also blossoms very late, which can affect productivity. However, 'Regina' has produced high yields in other countries (Balmer, 2000). Further research is needed on the blossoming time of 'Regina' under different weather conditions.

CONCLUSIONS

1. Growth in 'Kordia' and 'Regina' was vigorous, and growth in the other varieties was moderate or moderate-to-vigorous.
2. The most precocious variety was 'Vanspur'.
3. The most productive variety was 'Van', followed by 'Vanspur', 13-S27-17, 'Kordia', 'Lapins', 'Celeste', 'Bigarreau Burlat' and 'Regina'.
4. 'Regina' blossomed very late. In 2003, 'Regina' blossomed very rapidly under unfavorable weather conditions. The air temperature was over 25°C, which reduced blossom and fruit set.
5. The varieties with the largest fruits were 'Regina' and 'Celeste'.
6. The variety most susceptible to fruit skin cracking was 13-S27-17.
7. The most promising varieties are 'Celeste', 'Vanspur', 'Lapins' and 'Kordia'.

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WYNIKI BADAŃ Z ZAGRANICZNYMI ODMIANAMI CZEREŚNI W BUŁGARII

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STRESZCZENIE

Doświadczenie przeprowadzono w latach 1998-2003. Przedmiotem badań były drzewa czereśni odmian: 'Celeste', 'Lapins', 'Vanspur', 'Kordia' i 'Regina' oraz mieszańca 13-S27-17, otrzymanego w kanadyjskiej stacji doświadczalnej w Summerland. Kombinację kontrolną stanowiły czereśnie odmian 'Burlat' i 'Van', które od dawna są uprawiane w Bułgarii. Wszystkie czereśnie zaszczepiono na siewkach antypki P1 i posadzono w rozstawie 6 x 4,5 m. Drzewa prowadzono w formie przewodnikowej i w razie potrzeby doraźnie nawadniano.

Po sześciu latach od posadzenia drzewa odmian 'Kordia' i 'Regina' rosły silniej od pozostałych. Drzewa odmiany 'Vanspur' najwcześniej rozpoczęły owocowanie. Najwyższą plennością wyróżniały się czereśnie odmian 'Van', 'Vanspur' oraz mieszańca 13-S27-17, a w dalszej kolejności – 'Kordia' i 'Lapins'. W 2003 roku drzewa odmiany 'Regina' kwitły bardzo późno, kiedy temperatura powietrza przekraczała 25^{0}C, co mogło niekorzystnie wpłynąć na liczbę zawiązanych owoców. Największe owoce (9,9-10 g) miały czereśnie odmian 'Regina' i 'Celeste', natomiast owoce mieszańca 13-S27-17 okazały się najbardziej podatne na pękanie.

Słowa kluczowe: czereśnia (*Prunus avium)*, odmiana, wzrost, owocowanie