

RESEARCH CONCERNING QUALITY PARAMETERS CHANGE OF EARLY SWEET CHERRY CULTIVARS DURING MATURATION

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During May-June 2009, 5 early sweet cherry cultivars („Cetașua”, „Cătălina”, „Rivan”, „Bigarreau Moreau” and „Bigarreau Burlat”) were considered for the study of existing experimental plot of Fruit Growing Research Station Iași- Romania, who sought modification of quality parameters during maturation: equatorial diameter, fruit weight and soluble solids content. For analyzed fruit size, determinations were made on the equatorial diameter and fruit weight in 5 dates corresponding to different stages of maturation between 20 and 50 days after full bloom. There have been changes of these parameters between the first and the 5th date of harvest, as follows: fruit weight increased in „Cetășua” from 0.76 g to 3.13 g and „Bigarreau Moreau” from 1.01 g to 5.63 g; equatorial diameter of „Bigarreau Moreau” increased from 10.55 mm to 21.62 mm, and „Cetășua” increased from 10.28 mm to 16.28 mm. To determine the sweet taste, was analyzed soluble solids content in 3 different stages of maturation between 30 and 50 days after full bloom. „Cetășua” has increased from 10.2° Brix to 14.6° Brix and „Bigarreau Moreau” from 9.9° Brix to 13° Brix. „Catalina” noted compared with the varieties studied, the average fruit weight and soluble solids content with values of 6.45 g and 15.63° Brix respectively in the last stage of maturation and „Bigarreau Moreau” was noted by equatorial diameter which averaged 21.62 mm at the last stage of maturation.

Catalina, Bigarreau Burlat and Bigarreau Moreau have optimum harvest period in the range 38-42 days after full bloom, but Catalina have better fruit quality.

Key words: *Prunus avium, harvest date, soluble solids content, fruit size, early sweet cherry*

Requirements early ripening fruits are increased [3], at the beginning of harvesting sweet cherries, profit being higher by 50% / kg. So, at these species, the producers are more interested by quality fruit than production [7]. As the variety is approaching commercial maturity, fruit size increased, being in good correlation with the refractometrical index [8,11,6,2].

At very early and early sweet cherry cultivars the fruit weight is generally lower than seasonal cultivars, ranging between 2 g and 5.5 g [4,9,10].

Therefore, at these cultivars are admitted to first quality fruit with minimum diameter 16 mm, witch indicating a minimum weight of 5 grams [1].

However, in France, early cultivars like Primulat Ferprim, Earlise Rivedel, Bigarreau Burlat have a medium size between 24-27 mm [5].

Early cultivars as Rivan, Bigarreau Moreau and Bigarreau Burlat are most common in Romanian and we intend to confronted them with two new early sweet cherry cultivars like Cetățuia and Cătălina, created at FGRS Iași-România.

We also propose to establish the optimal period of harvest of each cultivar, by studying the dynamics of some quality parameters during maturation.

MATERIAL AND METHOD

Research has been done in 2009, from 6 May to 1 June, taking the study five early sweet cherry cultivars of experimental plot existing at FGRS Iasi- România.

Trees are planted at 5x4 m distance, with crown free fan-shaped with support system and are 18 years old after planting.

To determine the fruit size were weighed samples of 15 fruits in 4 repetitions, in 5 different stages of maturation, using an electronic balance type Radwag, 0.01g accuracy.

Soluble solids content was determined using a refractometer (Zeiss), on samples of 15 fruits in 4 repetitions in 3 different stages of maturation.

Were measured by using the statistical processing of data by analysis of variance for bifactorial experiences.

For factor A, represented by stage of maturation were five different determinations on the equatorial diameter and fruit weight, respectively: a1 = 20 days after full bloom (DAFB), a2 = 26 DAFB, a3 = 32 DAFB, a4 = 38 DAFB , a5= 42 DAFB.

In determining the soluble solids content, factor A has 3 variants, corresponding to the period from 32 to 42 DAFB.

Factor B, represented by cultivar, five variants were: b1 = Cetățuia, b2 = Cătălina, b3 = Rivan, b4 = Bigarreau Moreau, b5 = Bigarreau Burlat, all of which are cultivars with early or very early ripening.

RESULTS AND DISCUSSIONS

In phase I (20 DAFB) of maturation, **fruit equatorial diameter** has been minor differences in comparisons between cultivars, very different values being recorded from the 2nd stage of maturation (26 DAFB).

Between 26-32 DAFB, Rivan was seconded very significant positive compared with all other cultivars (*Table 1*). Between 38-42 DAFB, at Catalina, Bigarreau Moreau and Bigarreau Burlat, equatorial diameter differences were very significant positive compared with Cetatuia and Rivan (*table 1*). Very significant positive increases of equatorial diameter were recorded in the range 20-26 DAFB at Rivan (4.8 mm), in the range 26-32 DAFB at Bigarreau Burlat (3.9 mm) and within 38-42 DAFB at Catalina and Bigarreau Moreau (4.5 mm) (*table 2*).

At 20 DAFB differences in **weight of the fruit** of all cultivars were statistically insignificant. In the range 26-32 DAFB Rivan have very significant positive variation of fruit weight compared with Cetățuia, Bigarreau Moreau and Cătălina (*table 3*).

Table 1

Differences of fruit equatorial diameter (mm) at some cultivars in the same maturation stage

Comparison between cultivars	Difference (mm) and significance	Comparison between cultivars	Difference (mm) and significance
a1b2-a1b1	0.12	a3b2-a3b1	0.46
a1b3-a1b1	0.38	a3b3-a3b1	2.65 ^{***}
a1b3-a1b2	0.26	a3b3-a3b2	2.19 ^{***}
a1b4-a1b1	0.27	a3b4-a3b1	0.01
a1b4-a1b2	0.15	a3b4-a3b2	-0.44
a1b4-a1b3	-0.11	a3b4-a3b3	-2.63 ^{ooo}
a1b5-a1b1	0.15	a3b5-a3b1	1.39
a1b5-a1b2	0.04	a3b5-a3b2	0.93
a1b5-a1b3	-0.23	a3b5-a3b3	-1.26 ^o
a1b5-a1b4	-0.12	a3b5-a3b4	1.37 ^{***}
a2b2-a2b1	0.02	a4b2-a4b1	4.76 ^{***}
a2b3-a2b1	3.29 ^{***}	a4b3-a4b1	0.64
a2b3-a2b2	3.28 ^{***}	a4b3-a4b2	-4.12 ^{ooo}
a2b4-a2b1	0.1	a4b4-a4b1	2.96 ^{***}
a2b4-a2b2	0.08	a4b4-a4b2	-1.8 ^{oo}
a2b4-a2b3	-3.2 ^{ooo}	a4b4-a4b3	2.32 ^{***}
a2b5-a2b1	0.02	a4b5-a4b1	2.81 ^{***}
a2b5-a2b2	0.06	a4b5-a4b2	-1.95 ^{oo}
a2b5-a2b3	-3.28 ^{ooo}	a4b5-a4b3	2.18 ^{***}
a2b5-a2b4	-0.08	a4b5-a4b4	-0.15
a5b2-a5b1	4.18 ^{***}	a5b4-a5b3	3.77 ^{***}
a5b3-a5b1	1.63 ^{***}	a5b5-a5b1	4.99 ^{***}
a5b3-a5b2	-2.55 ^{ooo}	a5b5-a5b2	0.8175
a5b4-a5b1	5.4 ^{***}	a5b5-a5b3	3.37 ^{***}
a5b2-a5b1	4.18 ^{***}	a5b5-a5b4	-0.4

DL 5%= 1.1513 mm; 1%= 1.5312 mm; 0.1%= 1.9917 mm

a₁= 20 DAFB.; a₂= 26 DAFB.; a₃= 32 DAFB, a₄= 38 DAFB, a₅= 42 DAFB;
b₁= *Cetățuia*; b₂= *Cătălina*; b₃=*Rivan*; b₄= *Bigarreau Moreau*; b₅= *Bigarreau Burlat*

Between 38-42 DAFB Catalina, Bigarreau Burlat and Bigarreau Moreau have very significant positive variation compared to Rivan and Cetățuia (*table 3*).

Between 20-42 DAFB, all cultivars have been very significant positive increases in fruit weight, except Rivan, which have the negative variation at 42 DAFB (*table 4*).

Soluble solids content showed highly significant positive differences in the range 20-32 DAFB at Catalina compared with all other cultivars: Cetățuia, Rivan, Bigarreau Moreau and Bigarreau Burlat (*table 5*).

In all 5 cultivars, differences in soluble solids content at an interval of 6 days, were very significant positive, registered a high growth (between 0.83 - 3.6 ° Brix) from a stage of maturity at another.

Table 2

**Differences of fruit equatorial diameter (mm) at same cultivar
in the different maturation stages**

Comparison between maturation stages	Difference (mm) and significance	Comparison between maturation stages	Difference (mm) and significance
a2b1-a1b1	1.89 ^{**}	a3b1-a2b1	2.578 ^{**}
a2b2-a1b2	1.78 ^{**}	a3b2-a2b2	3.02 ^{**}
a2b3-a1b3	4.8 ^{***}	a3b3-a2b3	1.93 ^{**}
a2b4-a1b4	1.72 ^{**}	a3b4-a2b4	2.5 ^{**}
a2b5-a1b5	1.81 ^{**}	a3b5-a2b5	3.89 ^{***}
a4b1-a3b1	1.54 ^{**}	a5b1-a4b1	-0.06
a4b2-a3b2	5.84 ^{***}	a5b2-a4b2	-0.64
a4b3-a3b3	-0.47	a5b3-a4b3	0.93
a4b4-a3b4	4.49 ^{***}	a5b4-a4b4	2.38 ^{**}
a4b5-a3b5	2.97 ^{**}	a5b5-a4b5	2.12 ^{**}

DL 5%= 1.0613 mm; 1%= 1.4187 mm; 0.1%= 3.5328 mm

a₁= 20 DAFB; a₂= 26 DAFB; a₃= 32 DAFB; a₄= 38 DAFB; a₅= 42 DAFB;

b₁= *Cetățuia*; b₂= *Cătălina*; b₃=*Rivan*; b₄= *Bigarreau Moreau*; b₅= *Bigarreau Burlat*

Table 3

Differences of fruit weight (g) at the different cultivars in the same maturation stage

Comparison between cultivars	Difference (g) and significance	Comparison between cultivars	Difference (g) and significance	Comparison between cultivars	Difference (g) and significance
a1b2-a1b1	0.09	a2b5-a2b2	0.1	a4b4-a4b2	-1.23 ^{ooo}
a1b3-a1b1	0.16	a2b5-a2b3	-0.7 ^{oo}	a4b4-a4b3	0.71 ^{**}
a1b3-a1b2	0.07	a2b5-a2b4	-0.01	a4b5-a4b1	1.88 ^{***}
a1b4-a1b1	0.25	a3b2-a3b1	0.21	a4b5-a4b2	-1.1 ^{ooo}
a1b4-a1b2	0.16	a3b3-a3b1	1.19 ^{***}	a4b5-a4b3	0.83 ^{***}
a1b4-a1b3	0.09	a3b3-a3b2	0.98 ^{***}	a4b5-a4b4	0.13
a1b5-a1b1	0.25	a3b4-a3b1	0.03	a5b2-a5b1	2.28 ^{***}
a1b5-a1b2	0.16	a3b4-a3b2	-0.18	a5b3-a5b1	-0.16
a1b5-a1b3	0.09	a3b4-a3b3	-1.16 ^{ooo}	a5b3-a5b2	-3.48 ^{ooo}
a1b5-a1b4	0.01	a3b5-a3b1	0.59 [*]	a5b4-a5b1	2.5 ^{***}
a2b2-a2b1	0.4	a3b5-a3b2	0.38	a5b4-a5b2	-0.83 ^{ooo}
a2b3-a2b1	1.22 ^{***}	a3b5-a3b3	-0.6 ^o	a5b4-a5b3	2.65 ^{***}
a2b3-a2b2	0.8 ^{**}	a3b5-a3b4	0.55 [*]	a5b5-a5b1	2.28 ^{***}
a2b4-a2b1	0.52	a4b2-a4b1	2.98 ^{***}	a5b5-a5b2	-1.05 ^{ooo}
a2b4-a2b2	0.11	a4b3-a4b1	1.04 ^{***}	a5b5-a5b3	2.43 ^{***}
a2b4-a2b3	-0.7 ^{oo}	a4b3-a4b2	-1.93 ^{ooo}	a5b5-a5b4	-0.22
a2b5-a2b1	0.52 ^o	a4b4-a4b1	1.75 ^{***}		

DL 5%= 0.477 g; DL 1%= 0.634 g; DL 0.1%= 0.825 g.

a₁= 32 DAFB; a₂= 38 DAFB; a₃= 42 DAFB;

b₁= *Cetățuia*; b₂= *Cătălina*; b₃=*Rivan*; b₄= *Bigarreau Moreau*; b₅= *Bigarreau Burlat*

Table 4

Differences of fruit weight (g) at same cultivar in the different maturation stages

Comparison between maturation stages*	Difference (g) and significance	Comparison between maturation stages	Difference (g) and significance
a2b1-a1b1	0.16 ^{***}	a4b1-a3b1	0.5 ^{***}
a2b2-a1b2	0.48 ^{***}	a4b2-a3b2	3.27 ^{***}
a2b3-a1b3	1.21 ^{***}	a4b3-a3b3	0.36 ^{***}
a2b4-a1b4	-2.45 ⁰⁰⁰	a4b4-a3b4	2.22 ^{***}
a2b5-a1b5	0.42 ^{***}	a4b5-a3b5	1.79 ^{***}
a3b1-a2b1	1.2 ^{***}	a5b1-a4b1	0.52 ^{***}
a3b2-a2b2	0.99 ^{***}	a5b2-a4b2	0.87 ^{***}
a3b3-a2b3	1.17 ^{***}	a5b3-a4b3	-0.68 ⁰⁰⁰
a3b4-a2b4	0.71 ^{***}	a5b4-a4b4	1.27 ^{***}
a3b5-a2b5	1.27 ^{***}	a5b5-a4b5	0.92 ^{***}

DL 5%=0.0945 g; ; DL 1%= 0.1262 g; DL 0.1%= 0.1652 g.

a₁= 20 DAFB; a₂= 26 DAFB; a₃= 32 DAFB; a₄= 38 DAFB; a₅= 42 DAFB;

b₁= *Cetățuia*; b₂= *Cătălina*; b₃=*Rivan*; b₄= *Bigarreau Moreau*; b₅= *Bigarreau Burlat*

Tabelul 5

Differences of soluble solids content (° Brix) in same maturation stage at the different cultivars

Comparison between cultivars	Difference (Brix) and significance	Comparison between cultivars	Difference (Brix) and significance	Comparison between cultivars	Difference (Brix) and significance
a1b2-a1b1	1.02 ^{***}	a2b2-a2b1	2.88 ^{***}	a3b2-a3b1	1.15 ^{***}
a1b3-a1b1	-0.02	a2b3-a2b1	-0.46 ⁰⁰	a3b3-a3b1	-1.35 ⁰⁰⁰
a1b3-a1b2	-1.04 ⁰⁰⁰	a2b3-a2b2	-3.34 ⁰⁰⁰	a3b3-a3b2	-2.5 ⁰⁰⁰
a1b4-a1b1	-0.26	a2b4-a2b1	-1.04 ⁰⁰⁰	a3b4-a3b1	-1.42 ⁰⁰⁰
a1b4-a1b2	-1.28 ⁰⁰⁰	a2b4-a2b2	-3.92 ⁰⁰⁰	a3b4-a3b2	-2.57 ⁰⁰⁰
a1b4-a1b3	-0.23	a2b4-a2b3	-0.58 ⁰⁰⁰	a3b4-a3b3	-0.07
a1b5-a1b1	-0.19	a2b5-a2b1	-0.17	a3b5-a3b1	-2.06 ⁰⁰⁰
a1b5-a1b2	-1.21 ⁰⁰⁰	a2b5-a2b2	-3.04 ⁰⁰⁰	a3b5-a3b2	-3.21 ⁰⁰⁰
a1b5-a1b3	-0.16	a2b5-a2b3	0.3	a3b5-a3b3	-0.71 ⁰⁰⁰
a1b5-a1b4	0.07	a2b5-a2b4	0.88 ^{***}	a3b5-a3b4	-0.64 ⁰⁰⁰

DL 5%= 0.3183; DL 5%= 0.427; DL 5%=0.5647

a₁= 32 DAFB, a₂= 38 DAFB, a₃= 42 DAFB;

b₁= *Cetățuia*; b₂= *Cătălina*; b₃=*Rivan*; b₄= *Bigarreau Moreau*; b₅= *Bigarreau Burlat*

CONCLUSIONS

In the range 26-32 DAFB Rivan grew very significant positive of equatorial diameter and fruit weight, this being the optimal period of harvest to them, after this period is ahead of cultivars Catalina, Bigarreau Moreau and Bigarreau Burlat.

Cetatuia is a very early sweet cherry cultivar, but have a small fruit compared with Rivan, which have the same harvest maturation.

Catalina noted by increasing the size of the fruit within 38-42 DAFB, very significant positive differences compared with Cetatuia, Rivan, Bigarreau Moreau and Bigarreau Burlat, both in equatorial diameter, average fruit weight and in the soluble solids content.

Catalina, Bigarreau Burlat and Bigarreau Moreau have optimum harvest period in the range 38-42 DAFB.

We recommend Catalina for cultivation as early sweet cherry cultivar with fruit quality better than Bigarreau Burlat and Bigarreau Moreau.

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