The Study of Analysed Biochemical Parameters on Fruits of *Prunus cerasifera* Ehrh. Biotypes

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Prunus cerasifera Ehrh. fruits, as well as other stone fruits, have a number of features which make can be used: fresh consumption, in canned food industry and for the manufacture of brandy. In this paper, some fruits of Prunus cerasifera Ehrh. biotypes found in Fruit -Growing Area Voine°ti were biochemically analyzed (parameters were: soluble dry matter, vitamin C, titratable acidity expressed in malic acid). The research was carried out over two consecutive years, 2013 and 2014 and 14 biotypes were analyzed: yellow wax cherry 9 and 5 red wax cherry harvested from the area Voinesti (Dambovita).

Keywords: Prunus cerasifera Ehrh., soluble dry matter, vitamin C, malic acid

Generally, *Prunus cerasifera* Ehrh. fruits cannot compare with the best fruits for meal neither the taste nor size. Negative feedback that is generally towards this fruits is due to the mix of types and different shapes in terms of their quality and the fact that most often these are harvested raw, unmatured and they are away to have maximum taste qualities.

If it left to mature fruits, many of *Prunus cerasifera* Ehrh. biotypes have acceptable taste qualities, being rich in sugar than some summer plums, others have a more pronounced flavor and quite rich in vitamin C. Often the consumer is attracted only by the size fruit and only second of their wealth in sugar.

The industrialization or fruit processing is done in so a limited framework for household needs and in large quantities as a marketable commodity. From *Prunus cerasifera* Ehrh. fruits are made compotes, jams, marmalade and brandy, sometimes even less juice or wine and dried fruits [1].

In 2013 and 2014, 14 *Prunus cerasifera* Ehrh. biotypes were harvested and analysed: *yellow wax cherry 9 and 5 red wax cherry*. The analysed biotypes were harvested from Voinesti area, a region recognized as reference for fruit-grower in our country.

For the biotypes of wax cherry to which the fruit analyzes conducted in 2013 to good results in some biophysical or biochemical parameters, in 2014 tests were repeated to see if the values obtained in the previous year are the same or close, allowing to recommend as biotypes with edible or technological superior qualities of fruits.

From each biotype, it was necesarry 100 fruits for analyzes.

The analyzed biophysical parameters were: total weight of the fruit, pulp weight, kernels weight, height and diameter of fruit.

The analyzed biochemical parameters were: titratable acidity expressed in malic acid, soluble dry matter, vitamin C.

Experimental part

The acidity of food can be determined by alkali titration in the presence of phenolphthalein as an indicator.

$$R - COOH + NaOH \rightarrow R - COONa + H_2O$$

The reagents used were:
- sodium hydroxide, 0.1N;
- phenolphthalein solution 1% in ethanol 95% vol.

Weigh 10 g of the product, it increases well and places in a 250 mL Erlenmeyer flask with 50 mL of distilled water and stir to mix. The Erlenmeyer flask containing the sample adapted to a reflux condenser and heated on a boiling water bath for 30 min.

Cool the content of the flask at room temperature, then decant quantitatively into a 250 mL volumetric flask and make up with distilled water (V1). It is stirred to homogeneity and filtered through a medium-porosity filter paper.

Collect 50 mL of the filtrate, it is added several drops of the phenolphthalein solution and titrated with aqueous sodium hydroxide 0.1 N until the appearance of pink color which persists for 30 seconds. Record the volume of sodium hydroxide solution used in the titration of 0.1 N (V3).

Carry out two parallel determinations of the same sample for analysis [2].

By soluble substances is meant the concentration, expressed in weight percent of an aqueous solution of sucrose which has the same refractive index as the product analyzed, according to the determination. The method is based on the relationship that exists between the refractive index and the content of soluble substance from a solution. At refractometer, it is reading the refractive index and the percentage of soluble solids at a temperature of 20±0.5° C.

For determinations, it is necessary Abbe refractometer provided with a graduated scale the values of the refractive indices and percentage of sucrose. It makes an average sample of fruit pulp. Squeeze through gauze clean and dry,

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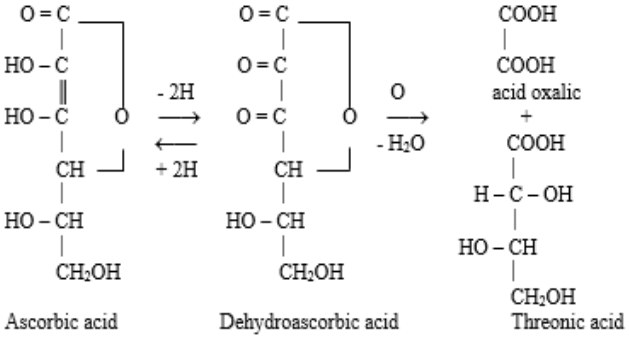
remove the first drops of liquid, and the rest is kept for determination.

On the fixed refractometer prism, apply 2-3 drops with a rod above the prepared sample and close prisms sample immediately to prevent evaporation. The eyepiece is moving to overlap with the line separating the two fields. Read directly the percentage of soluble solids.

The determination is performed at a temperature of 20±0.5°C or at different temperatures from this by a maximum of 5°C. Carry out two, three determinations on the same sample and the arithmetic mean of the values obtained [3].

In order to determine the content of vitamin C, the method is based on the oxidation of vitamin C with iodine in an acid medium according to the reaction :

$$KIO_3 + 6HCl + 5KI \rightarrow 3I_2 + 6KCl + 3H_2O$$
$$I_2 + H_2O \rightarrow O + 2HI$$



Iodine required for the oxidation reaction is produced by the reaction of potassium iodate and potassium iodide in an acidic medium according to the reaction:

$$KIO_3 + 5KI + 6HCl \rightarrow 3I_2 + 6KCl + 3H_2O,$$

and starch is used as an indicator that the solution will turn blue when ascorbic acid is oxidized throughout, liberated iodine according to the reaction remains free.

Reagents used:

- potassium iodide solution 0.004N;
- 1% potassium iodide solution freshly prepared;
- 1% starch solution (fresh solution);
- 2% hydrochloric acid solution.

Take 5 g of the product to be analyzed and these were grounded with 20 mL of HCl 2% (to avoid oxidation). Content mortar passes quantitatively into a 100 mL volumetric flask and make up with distilled water. The sample obtained mix and allow standing 10 min for extraction. After extraction, it was filtered through fluted filter or centrifuge. From the filtrate obtained is taken 10 mL, add 30 mL of distilled water, 5 mL of 1% KI solution and a few drops of 1% starch.

After stirring, titrate immediately with a solution of KIO_3 0.004N. The appearance of a blue color indicates the end of reaction for the oxidation of vitamin C, because only then iodine unconverted into hydriodic acid is reacted with starch [4].

Results and discussions

Titratable acidity, expressed in mL NaOH 0.1N at 100 g, is given by:

$$\text{Titratable acidity} = \frac{V1xV3x0,1}{V2xm} \chi 100 \text{ (mL NaOH 0.1N / 100g)}$$

, where:

V_1 – the total volume of test solution in the volumetric flask, mL;

V_2 – the volume of solution for determination, mL;

V_3 – the volume of NaOH 0.1N solution used on titration, mL;

m – mass of the test sample taken.

The acidity of various food products is expressed in the predominant acid or degrees of acidity. In this case, the malic acid is prevailing. To express titratable acidity in grams of malic acid, the result will multiply by the formula with milligrams of malic acid (0.0067).

If the determination was performed at 20°C±0.5 percentage soluble solids is read directly from the scale unit. If the determination was performed at a different temperature other than 20°C, when the reading percentage soluble solids in a refractometer is corrected according to the formula:

s.u.s. = s.u.s.^{t} + 0,00013 (t - 20), where:

s.u.s. – the percentage soluble solid at temperature t;

t – temperature at which the reading was taken, °C.

The contain in ascorbic acid is established by relation:

$$\text{mg ascorbic acid/100 g} = \frac{V \cdot t}{m} \cdot d \cdot 100,$$

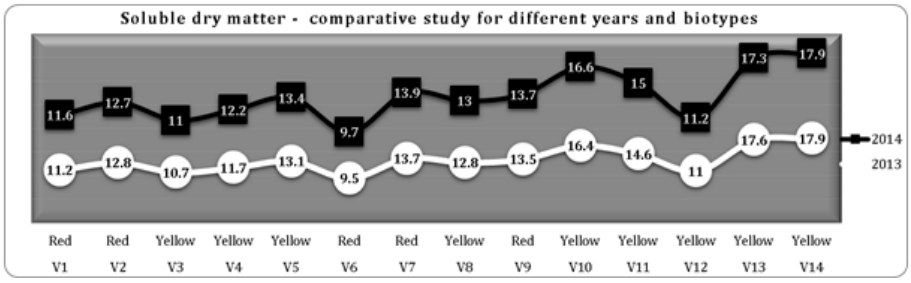
V – the volume potassium iodide 0.004N solution used for titration, in mL;

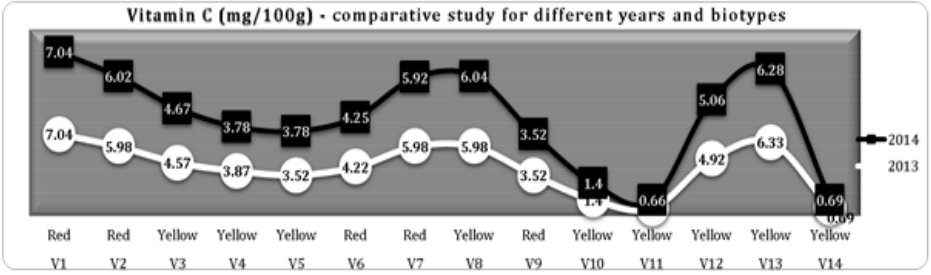
t – the titre of the solution of potassium iodide 0.004N relative to ascorbic acid, in mg/mL;

m – mass of the test sample taken, in g;

d – dilution performed (10).

The calculation is made at 100 g, taking into account the dilution carried out and that 1 mL of potassium iodate is corresponding to 0.088 mg ascorbic acid.





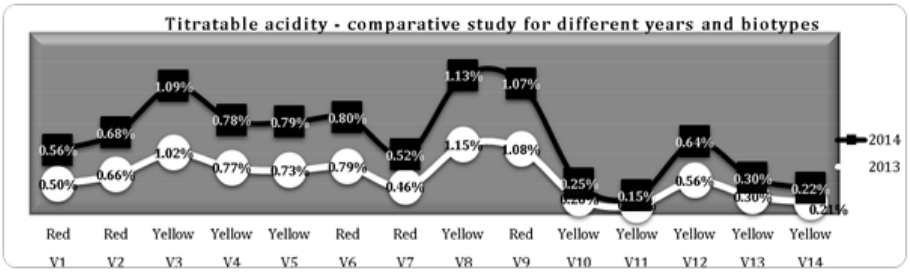


Table 1

COMPARATIVE DATA BETWEEN PLUM AND CHERRY ABOUT THE SIZE, CONTENT DRY MATTER AND VITAMIN C

Species	Fruit weight (g)	Fruit length (cm)	Fruit thickness (cm)	Soluble dry matter (%)	Vitamin C (mg %)
PLUM	9.37 – 27.43	2.1 – 4.3	2.0 – 3.4	14.9	4-7
CHERRY	3-5	1.9 – 2.3	1.8 – 3.0	12-17	3-7

Species	Water	Sugar	Malic acid
APRICOTS	85.40	10.40	1.19
PLUMS	86.10	14.92	1.46
PEACHES	85.80	9.40	0.65

Table 2

CHEMICAL COMPOSITION OF FRESH FRUITS

By comparing these data with the existing literature on other species of stone fruit quality, it can be said that biotypes of wax cherry with properties at least similar to plum fruit exist: The quality is given by the high content of sugar (12 to 16 %), acids (0.16 to 2.3 %), vitamin C (4 mg %) [5].

Ghenea et al. [6] have some data on the composition of plum: moisture 78.7 %, vitamin C - 4 mg%, total sugar 2.40-3.85%. Sonea [7] gives some comparative data on biophysical and biochemical characteristics between stone species (table 1 and table 2).

Analyzing these data, a few biotypes of analyzed wax cherry with the same or even superior properties to other stone species can be identified.

Regarding the soluble dry substance, the biotypes with the highest values (upper stone species cited above) in 2013 were biotypes V13 (2013) - 17.6% and V14 (2013) - 17.9% . As regards the lower value of soluble dry substance of biotypes have analyzed biotypes V6 (2013) - 9.5 % and V3 (2013) - 10.7% . The other biotypes are within the soluble solids content STAS values from other species stone.

Following the analysis performed in 2014 on the two biotypes mentioned (V13 - 2013 and V14 - 2013), it is visible that this time the obtained values for soluble dry substance were higher: V13 (2014) - 17.3% and V14 (2014) - 17.9%.

Regarding vitamin C enumerate biotypes that were within the limits of plums and cherries value:

- in 2013 - biotype V3 - 4.57 mg% vitamin C, biotype V8 - 5.98 mg% vitamin C, biotype V12 - 4.92 mg% vitamin C, biotype V2 - 5.98 mg% vitamin C, biotype V1 - 7.04 mg% vitamin C, biotype V6 - 4.22 mg% vitamin C, biotype V7 - 5.98 mg% vitamin C, biotype V13 - 6.33 mg% vitamin C.

- in 2014 - biotype V3 - 4.67 mg% vitamin C, biotype V8 - 6.04 mg% vitamin C, biotype V12 - 5.06 mg% vitamin C, biotype V13 - 6.28 mg% vitamin C, biotype V2 - 6.02 mg% vitamin C, biotype V1 - 7.04 mg% vitamin C, biotype V6 - 4.25 mg% vitamin C, biotype V7 - 5.92 mg% vitamin C.

Malic acid content in analyzed in 2013 biotypes were ranged between values 0.13% and 1.15%. There are biotypes with higher values close to those of stone species: biotype V3 - 1.02% malic acid, biotype V8 - 1.15% malic acid, biotype V4 - 0.77% malic acid, biotype V6 - 0.79% malic acid, biotype V9 - 1.08% malic acid. After analysis from 2014, for these biotypes were obtained the following results: biotype V3 - 1.09% malic acid, biotype V8 - 1.13% malic acid, biotype V4 - 0.78% malic acid, biotype V6 - 0.80% malic acid, biotype V9 - 1.07% malic acid.

Conclusions

Following this presentation of comparative results achieved in the years 2013 and 2014, it can say that biotypes considered superior in 2013, preserved their superiority to track parameters on 2014, too. Thus, we might recommend that biotypes with edible and superior technologic qualities.

Analyzing these data, some biotypes of wax cherry with the same or even superior properties to other stone species can be identified.

In addition to the above characteristics for fresh consumption, the fruits have to fulfill other qualities: have a consistent pulp, peel hard (to resist transport) and be able to keep a long time. Most of wax cherry fruits not fulfill all these conditions, but there are types with more consistent pulp, peel strong and very elastic. The wax cherry fruits have a number of features which may be used on: the consumption of fresh food, canning industry and for the manufacture of brandy.

On fruit growing regions, the wax cherry fruits are considered lower quality because there are other species

far superior. In other regions, these fruits enjoy a better appreciation being widespread as table fruit.

Therefore, if we consider not wax cherry fruits in general, only the types with superior quality, as compare the summery plums with those noble, the conclusion would be that wax cherry fruits fulfilling the conditions of ordinary plums for table exist.

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