RESEARCH ON QUALITY CHARACTERISTICS OF THE FRESH AND REFRIGERATED CRATAEGUS MONOGYNA FRUITS

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Abstract

Forest berries are the most valuable fruits. This is a consequence of their bioactive compounds, low level of pesticides and other contaminants. This kind of fruits are very valuable because increase the local economies and sustainability of the area and because of their taste and color.

Fruits of Crataegus monogyna, there are one very valuable among berries because of high inocuity.

Present study try to monitories the following quality parameters of Crataegus monogyna fruits during storage because of very well known issues regarding storage of berries.

The parameters taken in to study were: pH, Dry matter, Vitamin C, Polyphenols, Flavonoids, Lycopen.

Key words: *Crataegus monogyna, pH, Dry matter, Vitamin C, Polyphenols, Flavonoids, Lycopen*

INTRODUCTION

Crataegus monogyna known as single-seeded hawthorn become is a traditional fruit that was in use in popular pharmacopea since the first milenium. In the last period was forgeted and neglected. This fact drive to the necesity to evaluate the single-seeded hawthorn fruits quality in order to have an overview about the fruits new properties and market stimulation by strong recomandation for new phurposes. This require solutions about the issues regarding harvesting, handling and storage of the fruits as well. The quality can decrease by storage conditions and time and affect shelf life of single-seeded hawthorn fruits.

Crataegus monogyna have a large habitat and in this way can be one of the most valuable and spreaded berrie from Romania.

There were considered 2 storage systems, fresh in bulk and refrigerated in bulk.

The importance of assesing different kinds of storage is related with economicaly aspects, because during harvesting in late autumn and even winter the process can use the effect of outdoor temperature and prevent important losse of bioactive compounds and important mass percentage.

Methods used for analysis were according with romanian standards and are quottation in latest studys and international methods.

MATERIAL AND METHOD

For determination of the physical-chemical and organoleptic indicators were carefully examined 3 samples from each variant of stored fruits.

The samples were kept fresh (20ºC) and refrigerated (0-4ºC) 7 days.

The parameters were determined in the same day and in the seventh day.

The samples were examined from the organoleptic point of view, and they analyzed the shape of the exterior, aspect of the section, general aspect, also the consistency, the color, the smell and the taste. The samples that not meet the normal properties of the fruits were considered alterated and were not taken in to study.

The physical-chemical examination consist in following parameters: pH, Dry matter, Vitamin C, Polyphenols, Flavonoids, Lycopen.

The research methods were according Romanian regulation. As following:

Organoleptical parameters:

Were done by scoring the samples from 0 to 10 points.

Vitamin C content: ***Vitamin C*** was extracted using metaphosphoric acid and the extract was titrate with iodine solution starch indicator (Kallner,1986).

Dry matter: was done using force draft oven at 105 ºC for one hour.

pH: was done using a pH-meter, potentiometric method.

The total phenolic (TP) content was determined by using the Folin-Ciocâlteu (1927) colorimetric method developed by Singleton and Rossi (1965). A diluted extract (0.5 ml) or phenolic standard was mixed with 2.5 ml Folin- Ciocâlteau reagent and after 5 minutes 2.0 mL sodium carbonate (7.5%). The absorption was read after 2 h at 20°C, at 750 nm. For the preparation of calibration curve 0.5 ml aliquot of 0.2, 0.4, 0.8 and 1.2 μM/ml aqueous gallic acid solution were used as the standard and expressed as mg of gallic acid equivalent (GAE) (Gergen, 2004).

Flavonoids: The total Flavonoid compounds content (FC) was measured with $AlCl_3$ colorimetric assay (Atanassova et al, 2011). The absorbance was measured at 510nm. As standard we used catechin.

Lycopen: Lycopene extraction from samples was realised with hexane:ethanol:acetone (2:1:1)(v/v) mixture following the method of Sharma and Le Maquer, 1996.

One gram of the homogenized samples and 25 ml of hexane: ethanol: acetone, were placed on the rotary mixer for 30 min., adding 10 ml distilled water and was continued agitation for another 2 min. The solution was left to separate into distinct polar and non-polar layers. The absorbance was measured at 472 and 503 nm, using hexane as a blank. The lycopene

concentration was calculated using its specific extinction coefficient of 3150 at 503 nm. The lycopene concentration was expressed as mg/100g product.

RESULTS AND DISSSIONS

Organoleptic examination did not reveal any significant changes to the conditions of admissibility imposed by legal regulations.

Table 1. Reserch results regarding dry matter of the fruits

No.	Sample	Fresh (%)	Refrigerated (%)	Loss percentage (%)
1	Sample 1	44,27	56,00	-26,49
2	Sample 2	47,82	53,38	-11,62
3	Sample 3	45,83	54,00	-17,82
	Average	45,97	54,46	-18,46

Because of morphological aspects the biggest dry matter was recorded to refrigerate fruits because of the stone removing. The sample 1 recorded the biggest dry matter percentage. This is important to be known because the efficiency of the storage and processing is affected by this parameter.

Table 2. Reserch results regarding Vitamin C of the fruits

No.	Sample	Fresh (mg%)	Refrigerated (mg%)	Diferences (%)
1	Sample 1	39,30	30,40	22,65
2	Sample 2	38,7	33,15	14,34
3	Sample 3	40,1	32,6	18,70
	Average	39,37	32,05	18,59

The highest Vitamin C content was recorded in fresh single-seeded hawthorn fruits. The Vitamin C content after cooling is significant lower in fruits, especialy because low quantity of cellular juice is drained during cooling. Because of the extraction of the stones the evaporating surface is very significant higher and drained much amounts than the similar process in whole fruits.

Table 3. Research results regarding Total amount of Polyphenolic content of the fruits

No.	Specie	Fresh (mg GAE/100g)	Refrigerated (mg GAE/100g)	Diferences (%)
1	Sample 1	1938,00	1318,00	31,99
2	Sample 2	1936,00	1320,00	31,82
3	Sample 3	1941,00	1320,00	31,99
	Average	1938,33	1319,33	31,93

Comparing with vitamin C the ratio of decreasing of Total amount of polyphenolic compound is much higher in fruits. The highest Total amount of polyphenolic compound content was recorded in fresh fruits. There is also evident the very significant decreasing of the level coresponding of processing (remove the stones), cooling and storage process.

Table 4. Research results regarding pH of the fruits

No.	Sample	Fresh, °	Refrigerated, °	Diferences, %
1	Sample 1	5,10	4,84	5,10
2	Sample 2	5,01	4,92	1,80
3	Sample 3	4,90	4,85	1,02
	Average	5,00	4,87	2,66

The pH evolution shown that during cooling and storage there were no alteration process for the samples excepting Sample. That allow us to suggest that high bioactive compounds level provide protection for fruits in the presence of sugar with exceptions that can be affected by contaminating microflora. The values recorded were according to our data relativ stabile. Samples 1 can be a error of determination or sample preparing.

Table 5. Research results regarding Flavonoids content of the fruits

No.	Sample	Fresh, mg CAT%	Refrigerated, mg CAT%	Diferences, %
1	Sample 1	882,22	777,14	11,91
2	Sample 2	882,13	777,06	11,91
3	Sample 3	881,98	777,42	11,86
	Average	882,11	777,21	11,89

The flavonoid content in fruits of single-seeded hawthorn was recorded a descendent trend. In this way it was noticeable that the decreasing was very significant, the amounts were upper 11%.

Table 5. Research results regarding Licopen content of the fruits

No.	Sample	Fresh, mg CAT%		Refrigerated, mg CAT%		Diferences, %	
		472 nm	502 nm	472 nm	502 nm	472 nm	502 nm
1	Sample 1	1,164	1,164	0,98	1,04	0	-6,12
2	Sample 2	1,172	1,155	0,96	1,05	1,45	-9,38
3	Sample 3	1,167	1,182	0,97	1,02	-1,29	-5,15
	Average	1,167	1,167	0,97	1,037	0,06	-6,87

The Lycopen content in the fruits were increasing because of the evaporation process that not affect this substance. This is more evident at 502 nm and is significant.

CONCLUSIONS

The biggest level of bioactive compounds according with our data was single-seeded hawthorn fresh fruits with the exception for Licopen.

The results shown that all the fruits taken in to study can be used after storage under controlate conditions for different purphoses.

The bioactive compounds level it was not stabile and decrease very significant. In this way there was shown the indirect effect of the processing (removing stones) that compared with other studies were the fruits remain intact present very significant variations.

The dry matter level after cooling and storing recorded also high levels of losses, for some samples over 20%.

In this way we suggest collecting, cooling and storing mainly fresh fruits in order to have the smallest losses from quantitative and qualitative point of view. For single-seeded hawthorn it is not recomanded processing (stone removing).

ACKNOWLEDGMENTS

The researches were carried out in the project LEONARDO DA VINCI – TRANSFER OF INOVATION, PROJECT TITLE: Food Industry - Food Legislation, Impact Analysis, Training and Cooperation Network in Europe-E-Learning, No. 2010-1-TR1-LEO05-35116, Project founded by European Comision.

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