SUPERIOR VALORIFICATION OF THE SEA BUCKTHORN FRUITS STORED BY FREEZING

VALORIFICAREA SUPERIOARĂ A FRUCTELOR DE CĂTINĂ ALBĂ DEPOZITATE ŞI PĂSTRATE PRIN CONGELARE

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Abstract. *One of the most valuable products processed from the sea buckthorn fruits (Hippophae rhamnoides L.) is the fresh pressed juice. The main problem is the possibility of extending the period of storage of the sea buckthorn fruits in order to obtain the fresh juice when the derivate products are processed. The purpose of this study is to investigate the storage possibilities of the sea buckthorn fruits for a period that covers a ripping cycle. Studying the variation of the organoleptic properties in different storage periods by freezing process, it has been discovered that the sea buckthorn fruits can be stored for a period of 360 days without being affected the quality of the final products.*

Key words: sea buckthorn, storage, freezing

Rezumat. *Unul dintre cele mai valoroase produse din fructe de cătină albă (Hippophae rhamnoides L.) este sucul proaspăt presat. Principala problemă este posibilitatea de prelungire a duratei de depozitare a fructelor de cătină în vederea obţinerii sucului proaspăt în momentul producerii preparatelor derivate. Scopul acestui studiu este de a investiga posibilităţile de depozitare a fructelor de cătină pe o perioadă care să acopere un ciclu de fructificare. Studiind variaţia proprietăţilor organoleptice pentru durate diferite de depozitare prin congelare, s-a constatat că fructele de cătină pot fi păstrate pentru o durată de 360 de zile fără a se afecta calitatea produselor obtinute.*

Cuvinte cheie: cătină albă, păstrare, congelare.

INTRODUCTION

The sale of the sea buckthorn *(Hippophae rhamnoides* L.*)* fruits in fresh is burdened by the fact that these fruits are not consumed as they are, but after they have been prepared or as derived products (Bernath and Foldesi, 1992). Due to its degree of very quick degradation and small storage period of the sea buckthorn fruits, in order to obtain a superior quality of the products the whole year, it is necessary to store them for a longer period (Artyomova, 2001). A modern method to extend the storage period is freezing them, the quality of the sea buckthorn juice obtained by processing the frozen fruits will remain the same (Radu, 1973). The low temperature, created with support of the artificial frost can prolong the storage period of the sea buckthorn fruits. The artificial frost is used for storing the fruits for a short (days) and longer (months) period (Beveridge et all. 1999).

In order to store the fruits for a short period it is used the *refrozen* procedure, a method through the fruits are stored at temperature more close to the freezing point (0^0 to 5^0C), without being completely frozen. Regarding the storage

of the fruits for a longer period, it is used the *congealment* procedure. The fruits are congealed at very low temperatures (until -20^{0}C), as the most part of the water contained in the fruits transform in fine ice crystals.

MATERIAL AND METHOD

The types of Şerpeni, Sf. Gheorghe and Şerbăneşti sea buckthorn have been used for this study, cultivated in a plantation in Roşia village, Sibiu county, belonging to a commercial society NP PROD. L.T.D. The fruits were mixed from all the cultivated types in equal proportions, the crop being made in August, September and October 2008.

In this paper, it has been studied the storage by freezing the sea buckthorn fruits and the variation of components and acidity of the juice in relation with the freezing temperature and the storage time.

First, there have been applied several treatments as: sorting, cleaning and freezing at temperatures between 0^0 and 6^0 C. Also, it had been taken into consideration the employment of a high quality of the sea buckthorn fruits, fresh and healthy.

The cleaning consists in removing the foreign bodies, leaves and branches. The selection was made by removing the non healthy fruits, injured or that do not have the specific color of the specie. The packaging was made in plastic bags in equal quantities, and after that preserved in refrigeration rooms (0-6 °C) by the moment of freezing. The fruits freezing was made in 2-3 days from harvesting, any extension of preserving time leading to a deterioration of product's quality. The main objectives of the study that we have proposed are the pursuit of the optimal freezing temperature and the storage period admitted, but also the fruit behavior at freezing, the organoleptical and physical or chemical modifications and acidity that took place during the frozen and storage process.

In order to freeze sea buckthorn fruits, it has been used a temperature between -15 to -20 degrees Celsius for different storage periods, starting from three hours to 360 days. It also have been established the fruits behavior and there have been made periodic organoleptic determinations of the fresh fruits stored for 90, 120, 270 and 360 days. The proportional factors are as follows: taste -4, consistence -2, smell -2, color -1 and shape -1. For determining the organoleptic properties (consistency, color, taste, flavor and form) were used the indicators and conditions from table 1.

Table 1

The indicators and conditions for determining the organoleptic properties

Organoleptic quality classes	Note (*o.m.*)	Qualification
95-100	10	Excellent
85-95	9	Very good
75-85	8	Good
65-75	7	Good enough
55-95	6	Satisfactory
45-55	5	Average satisfactory
35-45	4	Slight defective
25-35	3	Defective
15-25	2	Bad
5-15	1	Very bad
0-5	0	Discomposed

The general organoleptic figure (*Go*) is taken from the relation:

$$Go = o.m. \times Pf / 10.$$

To each organoleptic characteristic is given a mark (*o.m.*) from 1 to 10. This mark is multiplied with a proportional factor (*Pf*) that indicates the importance of the characteristic for a certain characteristic of the analysed product. The total of the proportional factors (*Pf*) must be 10.

Beside the organoleptical examination were made a long series of determinations regarding the acidity of juice obtained from frozen sea buckthorn fruits. The determination of seabucktorn juice acidity were performed by titration of a NaOH solution 0.1N, factor =1.0201, in the presence of phenolphthalein (the filtered juice was used).

RESULTS AND DISCUSSIONS

Using the organoleptic examination (consistency, colour, taste, smell and shape) and calculating a general organoleptic mark (*Go*), there were obtained quality qualifications connected to the storage period of the frozen sea buckthorn fruits.

The allowed preserving period was established when, after a storage period, the frozen product gets a quality qualification of at least good, respective the mark 7.

From this point of view the sea buckthorn fruits received the ranking "good to very good". This makes us to establish the preserving allowed period for the frozen sea buckthorn fruits of at least 360 days.

In figure 1 there is described a graph with the organoleptic modifications (general mark) for different storage periods.

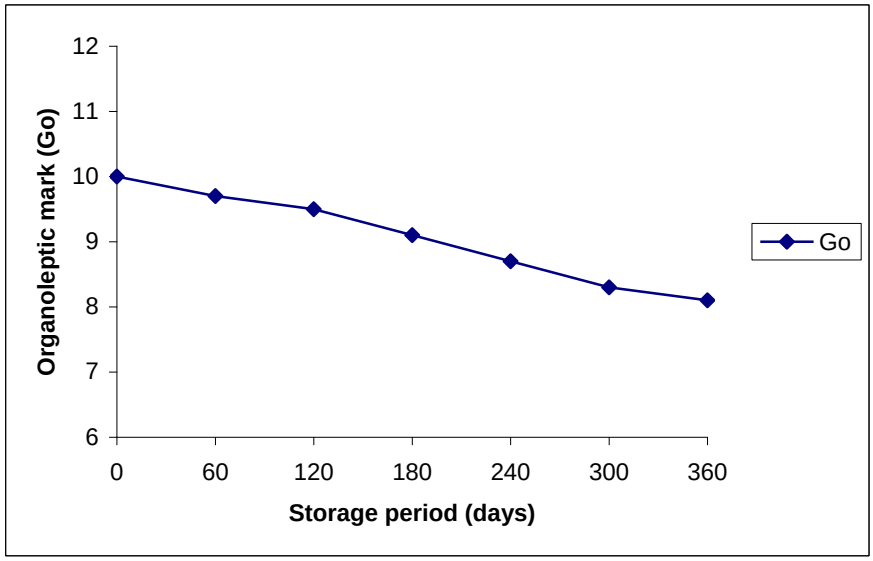

Fig. 1. The organoleptic modifications of the frozen sea buckthorne fruits

The acidity of juice obtained from white sea buckthorn frozen fruits and preserved a period of 360 days decreases compared to the acidity of juice obtained from fresh fruits with 20,5 %, having a slight increase by the middle of storage period (figure 2).

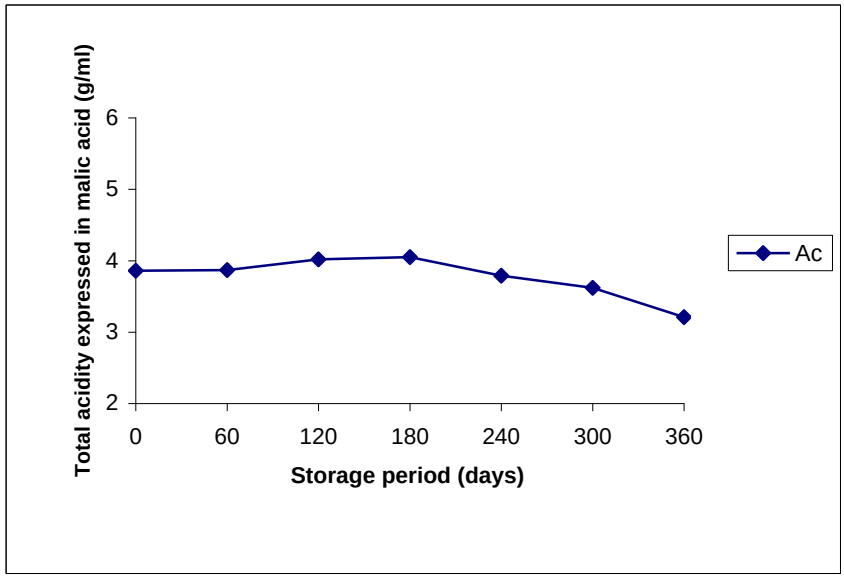

Fig. 2. Variation of total acidity expressed in malic acid (g/100ml) depending on the storage period

The obtained results confirm that the sea buckthorn fruits can be well frozen.

CONCLUSIONS

1. The preliminary treatments applied during the freezing process (cleaning, selection of fruits, packaging in equal amounts in plastic bags, as well as the preserving of these in refrigeration rooms with temperatures between 0 °C and 6 °C) guaranteed the proper conditions for the freezing operation.

2. In order to obtain high quality products from sea buckthorn, is recommended that the seabucktorn fruits be stored to the freezing temperature of – 20 °C and a preserving allowed period of 360 days.

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