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RESEARCH REGARDING THE TECHNOLOGIES OF CONDITIONING AND TEMPORARY STORAGE OF CHERRIES AND SOUR CHERRIES

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Abstract

Cherries and sour cherries are kernel species that show different resistance during the storage period due to the structural-textural differences of the pulp and the fragility of the epidermis. These differences make it possible for sour cherries to be stored for shorter periods of time compared to cherries, and the recorded quantitative losses are also different.

Key words: sour cherries, cherries, soluble dry matter, total acidity, vitamin C, temporary storage, quantitative losses.

INTRODUCTION

Cherries and sour cherries belong to the category of highly perishable horticultural species with a relatively short shelf life of 3-5 days. This shelf life may be extended if temporary storage is carried out under special conditions.

This sensitivity to external environmental factors (humidity, temperature, air circulation) is due to the peculiarities of structure, chemical composition, intense respiration, ability to mature after harvest, etc.

Cherries have a thin epidermis and low structo-textural firmness, yet there are also varieties with better firmness and lower juiciness.

Harvesting cherries and sour cherries for fresh consumption is done at maturity for consumption only in dry weather. When it comes to cherries, harvesting 2-3 days earlier can provide additional resistance. Harvesting is done in baskets, small capacity buckets, afterwhich the fruits are being dumped in crates of 5-10 kg capacity, which can be lined with parchment paper or polyethylene foil.

Sour cherries are more perishable than cherries, with higher losses if the recovery technology is not followed exactly. Harvesting is similar to that of cherries, with the difference that it can be done in two stages due to the staggered ripening of the fruit.

Once harvested, a pre-sorting of the fruits by categories of quality is performed, with fruits of extra and first quality being elected for storage.

For the extra quality, the fruits must have the shape, size and coloration specific to the variety, without any defects, with slight deformations and some variations regarding the coloration typical of the variety are allowed for first quality. The minimum diameter for extra quality is at least 21 mm, and for first quality at least 18 mm.

The fruit is transported as quickly as possible, using means of transport covered with tarpaulins for shorter distances or with machines equipped with cooling installations, especially for those transported over longer distances.

Means of temporary storage are required due to an exceeding quantity of fruits in the harvesting season. In this sense, it is recommended to store cherries and sour cherries in warehouses where environmental factors can be controlled: temperatures of 1-20^{o}C, 90-95% relative air humidity and a moderate air circulation, which should maintain the homogeneity of these factors without causing the peduncle to dehydrate. At temperatures below 0-10^{o}C the cherries lose their characteristic taste. Under these conditions, the shelf life of cherries is 14-21 days, yet varieties with a firm pulp have a longer shelf life. At a temperature of 2-50^{o}C the shelf life is reduced by 5-7 days, with losses exceeding 10-15%.

Under the same conditions, sour cherries can be stored for a maximum of 5 days, but, depending on the variety, the storage time can be extended up to a week. If the fruits are harvested in rainy weather or if the temperature exceeds 20^{o}C and the humidity a level of over 90%, quality impairments will be recorded, Radu, I.F., Gherghi A., 1967 Marca, Gh., 1987, Beceanu, D., 1994, 1998,1999, 2000, 2002, 2003, Ceaușescu, I., Iordăchescu, C., 1987, Gherghi, A., et al., 1981, 1983, 1984,1989, 1994, Burzo, I., et. al., 1984, 1986,. Marca, Gh., 2004, Potec, I., et. al., 1983, 1985, Stan Gh., 1999).

MATERIAL AND METHOD

Two varieties were studied: "Pietroase" cherries and "Crișana" sour cherries, intended for fresh consumption.

The behavior of the fruits during the transport, conditioning and temporary storage of the fruits was studies. Chemical analyzes were also carried out after harvesting the fruit on the soluble dry matter content, acidity and vitamin C.

Harvesting was done at consumption maturity. At the same time, a pre-sorting was performed, so that the fruits were sorted by quality. The extra and first quality fruits were intended for storage. The packaging was made in 5 kg crates, which were stored in cold stores at a temperature of 1-20ºC and 90-95% relative humidity. The crates were placed in a single row. The health of the fruits was monitored daily.

The observations regarding the behavior of the fruits were made visually, during the harvesting, pre-sorting and transport, the fruits keeping their structo-textural integrity and firm structo-texture.

The soluble dry matter was determined refractometrically.

The pH was determined by the pH-meter.

The vitamin C content was determined by iodometric methods both for the fresh and frozen sample. Thus, out of the average sample, 15 g of analysed product are weighed by the analytical balance which is pestled with 2 g of quartz sand and 10 ml of metaphosphoric acid, until a homogenous paste is formed. The mix is passed through a calibrated flask of 50 ml and is brought to the sign with metaphosphoric acid. Then, the next step is the filtration of the mix, out of which 10 ml are used for further analyses. Furthermore, two titrations are performed.

The titration of the standard solution of ascorbic acid: 10 ml of ascorbic acid, 20 ml of distilled water, 2 drops of hydrochloric acid 1M, 15 drops of starch solution 1% are put into an Erlenmeyer glass. The mix is titrated with iodine solution until the change of colour to aubergine-blue (V).

The titration of the analysed sample: the working technique is the one presented previously with the specification that the standard solution of ascorbic acid is replaced with 10 ml sample to be filtered. The titration is performed with iodine until the change of colour to aubergine-blue (V_1).

Vit. C mg/ 100 g product = $10 \times V_1 \times 5 / V \times m \times 100$

The aspect, colour and taste are analysed organoleptically for both the fresh and frozen samples.

RESULTS AND DISSCUSIONS

The results of the chemical analysis of cherries and sour cherries are presented in Table 1.

Table 1

Chemical composition of cherries and sour cherries (mean values)

Product	Soluble dry matter (%)	Acidity (%)	Vitamin C (mg/100 g)
Cherries	15	0,5	7,5
Sour cherries	12,8	1,5	10,2

The fruits have a high content of soluble dry matter in both kernel species. The content of vitamin C is higher in sour cherries (10.2 mg / 100 g fresh product), and the total acidity is also higher (1.5%).

The observations on the behavior of the fruits highlighted the fact that the fruits maintained their structo-textural integrity during harvesting, transport and conditioning, maintaing a firm structo-texture.

Regarding the health status of the fruits, the data were centralized after 5 days from storage and at the end of the storage period.

Losses recorded during storage are presented in Table 2.

Table 2

Quantitative losses recorded during storage of cherries and sour cherries

Product	Losses recorded five days after storage (%)	Losses recorded at the end of the storage period (14 days for cherries, 7 days for sour cherries, %)
Cherries	3	11
Sour cherries	7	17

The first signs of alteration occured after 2 days of storage for sour cherries, with moniliosis being detecte, the fungus spores probably coming from the orchard. Affected fruits and those around them were removed. The same disease was noted in cherries from the third day of storage. During the storage period, infections with Penicillium spp. and Rhizopus sp. Were detected, which caused fruit to rot. The depreciated fruits were permanently removed and weighed.

The analysis shows higher quantitative losses in sour cherries: 7% until the fifth day of storage and 17% at seven days of storage, when the decision to stop storage due to this high percentage of losses was taken. Fewer losses were recorded for cherries, which have a firmer structo-texture: 3% at five days of storage and 11% respectively, at the end of the storage period, after two weeks.

These differences in quantitative losses in the two kernel species are primarily due to the structural-textural differences in the pulp and the fragility of the epidermis, which provides different resistance to storage. In this sense, there is a good firmness of the pulp of the Pietroase cherry variety compared to the structure of the sour cherry pulp of the Crișana variety. Moreover, the epidermis of cherries is thicker than that of cherries, which gives them better protection against the influence of microorganisms found on the surface of the fruit.

CONCLUSIONS

When analyzing the studies that addressed the chemical composition and the behavior of the two kernel species, the following conclusions can be formulated:

1. Both species have a high content of soluble dry matter.

2. Sour cherries have a higher acidity and a higher content of vitamin C.

3. The chemical composition of the two species is a characteristic of the species and variety, being directly influenced by the pedoclimatic conditions and the cultural works applied to the orchards from the analysed year of production.

4. Regarding the behavior of the two species during storage, it was found that the health of the fruits was affected immediately after storage, respectively 2 days for sour cherries and 3 days for cherries.

5. After 5 days of storage, higher quantitative losses were recorded for sour cherries compared to cherries.

6. Significant quantitative losses of sour cherries led to the termination of storage on the seventh day for them and on the 14th day for cherries.

7.These differences in the quantitative losses recorded are primarily due to the structural-textural differences in the pulp and the fragility of the epidermis, which provides different resistance to storage. In this sense, there is a good firmness of the pulp of the Pietroase cherry variety compared to the structure of the sour cherry pulp of the Crișana variety. Moreover, the epidermis of cherries is thicker than that of cherries, which gives them better protection against the influence of microorganisms found on the surface of the fruit. The thin and fragile epidermis of sour cherries facilitates a more intense respiratory activity and is quickly affected by microorganisms.

8. Further research on the resistance of horticultural species to storage is recommended.

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