THE IMPORTANCE OF STORAGE ON MAINTAINING QUALITY FEATURES OF FRUITS

IMPORTANȚA DEPOZITĂRII ASUPRA MENȚINERII CARACTERISTICILOR DE CALITATE A FRUCTELOR

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Abstract: *Storage is necessary because production and consumption cycles are rarely synchronized. The storage of goods including support activities enables the achievement of customer service objectives. From field literature it is noticed that storage activity is considered to have a regulatory role between producer and consumer. Storage of goods must be improved nowadays and in the future it will change, being influenced by the changes in relationships with suppliers, in production, distribution, and also as a consequence of the need to maintain quality features, such as fruits on short, medium and long periods of time.*

Key words: *Storage, fruits, preservation conditions, quality changes.*

INTRODUCTION

Storage is an important operation present on the distribution channel, because environmental factors such as temperature, humidity, the presence of micro-organisms can cause damage to agricultural and food products (Boboc, D.,2006, page 63).

Among the activities that make up the supply chain, storage also plays an important role. Location, design and choice of storage facilities, in key points of the physical circuit of products, with view to achieve their functions in terms of efficiency, engage numerous decisions.

Storage also means the achievement of certain activities and services, which may have an important role for the logistics of products (Balaure, V., coord., page 414). Storage is necessary because many

agricultural goods are seasonally produced are products, while there is a continuous demand for them.

Storage ensures the solving of problems related to differences between the quantities of goods produced and the ones that are requested on the market, as well as differences between the moment of goods production and the moment of their being demanded by the customers (Kotler, Ph., 2000, page 747).

Storage of goods includes a set of support activities that help achieve the objectives of customer service (Bălan, Carmen., 2001, page 213).

MATERIALS AND METHODS

During the technical and economic circulation as a consequence of internal and external factors, the food products may undergo a series of physical, chemical, biochemical and microbiological processes and changes related to these processes, such as: the loss of water, the drying, pressing, the color darkening, changes of taste/smell, curing, fermentation, etc. (Diaconescu, I., 2002, page. 179-180).

Storing food products is an important phase of technical and economic circulation. It is a specific process by which product quality is maintained at the level of the quality characteristics prescribed either in normal or controlled circumstances.

During the conservation and the storage period, the goods may undergo changes under the influence of physical, chemical and biochemical factors, as a result, the storage processes of goods can be classified under the following criteria:

- the categories of goods, namely the types and the qualitative levels of each category of goods;
- the place or the logistics chain link where degradations occur;
- the trigger factors of degradations;
- the nature of products resulting in degradations or deteriorations;
- the type and the extent of changes undergone by goods (Petrescu, V., 2005, page 112).

Case study: fruits – conservation and storage

Fruits represent wide consumer food of plant origin, with an important role in nutrition due to special sensory characteristics and precious nutrients that they contain: carbohydrates, enzymes, organic acids, vitamins and minerals. A feature of fruits resides in the fact that most of them can be used in alimentation as such, in their fresh state, as well as in different dishes or in their preserved state (Diaconescu, I., et.al. 2007, page 152).

The structure of fruit consumption on species is scarce and as a result of storage conditions for apples, pears, quince, which cover most of the consumption in the period from November to May. In this sense, it is necessary to increase the amount of fruit per capita, but also to increase the importance of scarce species such as cherry, morello, apricot, peach, walnut, strawberry and fruit trees, and as a consequence, at certain times of the year, there appear on the market, gaps in supply and consumption.

Table no. 1.

The structure of annual fruit consumption on species-Kg/capita

Species	**Total fruit**	**Percent %**	**Of which:**			
			Fresh	**Processed**	**Frozen**	**Dehydrated**
Total fruit of which:	59,5	100,0	43,4	11,9	1,9	2,3
Apples	29,9	50,2	26,1	3,6	-	0,2
Pears	4,0	6,7	2,6	1,0	-	0,4
Plums	13,5	22,7	7,6	4,1	0,2	1,6
Apricots	1,6	2,7	1,2	0,2	0,1	0,1
Peaches	2,6	4,4	1,4	0,9	0,3	-
Cherries	1,7	2,9	1,3	0,4	-	-
Morello	2,6	4,4	1,0	0,8	0,8	-
Walnuts	1,2	2,0	1,0	0,2	-	-
Fruit Trees	0,5	0,8	0,2	0,2	0,1	-
Strawberries	0,8	2,2	0,4	0,3	0,1	-
Other fruit	1,2	1,0	0,6	0,4	0,2	-

Source: Chiran, A., 2004, page. 205

To eliminate the seasonal fruit consumption it is necessary to import tropical fruits (Chiran, A., coord, 2004, page 203) the emplacement, the construction or upgrading of storehouses.

The fruit consumption is presented in Table no. 1.

In addition to import, there are other measures needed, such as:

-obtaining varieties (of apple, pear, quince) specialized for long conservation;

-upgrading the storehouses, introducing controlled atmosphere which enables to extend the storage period until the end of May;

-the diversification of industrialization forms.

Taking into consideration the consumption of fresh fruit that is an absolute necessity, the fruit demand is presented in Table no. 2 according to the category of consumers.

Table no. 2.

The necessary of fruit g/day depending on the category of consumers

Category of consumers	**Age -years-**	**The necessary of fruit - g/day**
Children	1-12	150-300
Teenager	13-20	300
Adults	21-65	220-400
Aged People	Over 65	260
Pregnant and nursing women	-	370

Source: Chiran, A., 2004, page. 203

The fruits must cover about 15% of daily energetic needs.

These are products with a high water content (80-90%) determining the state of tenderness and freshness. (Maxim, Olga-Irina., 2009, page 120).

Nutritional qualities and specific organoleptic features place fruit production among the basic products that make up the daily food intake of humans.

In Romania, the evolution of the total fruit production is presented in Table 3.

Table no. 3.

The evolution of the total fruit production in Romania, in the period 2000/2004/2010

Year	**Total production**	**Apples and Pears**	**Plums**	**Peaches and Apricots**	**Cherries and Morello**	**Walnuts**	**Straw-berries**
2000	1301,0	560,9	549,6	46,7	73,7	31,5	11,7
2004	1300,0	637,0	550,0	37,0	60,0	6,0	38,5
2010	2200,0	1136,0	900,0	65,0	80,0	15,0	60,0

Source: Chiran, A., 2004, page. 201

The specialty literature shows that the evolution of the total fruit production presents a high index of inconstancy generated especially by changes of areas cultivated with trees and fruit shrubs, but also by the level of average productions per unit area (Chiran, A., coord, 2004, page 201).

Depending on the perishable degree, fruits are kept for a period of time in deposits. Highly perishable fruit are routed directly to industrial or commercial centers.

In Table 4 there are presented the groups of fruits depending on their resistance to handling, transport and temporary storage.

Table no. 4.

The rezistance of fruit at manipulation-transport-storage

No. crt.	**Group**	**Fruit**
1.	Very lightly perishable	Blueberry, strawberry, wild strawberry, blackberry, raspberry
2.	Lightly perishable	Gooseberry, apricot, cherry, summer apple and pear, peach, early grapes, morello
3.	Perishable	Quince, apple, pear, plum, table grape from late species
4.	Relatively resistant	Hazelnut, chestnut in shell, almond, walnut

Source: Diaconescu, I., Ardelean,D., Diaconescu, M., 2007, page.160

Temporary storage presents an economic importance, being a method through which fruit surplus is sent back on the market after a certain period of time, depending on the type of products, thus it is ensured the constant population supply with such products of great importance for the current consumption (Diaconescu, I., et.al. 2007, page 161).

In Table 5 there are presented the storage conditions for fruits.

Table no. 5.

Storage conditions for fruits.

Product	**Temperature, º C**	**Relative humidity, %**	**Other conditions**
Apples and pears	0.....+15	85.....95	Space ventilation
Table grapes	-1.....+1	75....85	Space ventilation, SO2 treatment
Walnuts	+1....+15	75.....80	In 25 – 50 kg bags

Source: Diaconescu, I., Ardelean,D., Diaconescu, M., 2007, page.161

RESULTS AND DISCUSSIONS

The main types of perishable causes for fruits are by evaporation, through respiration and mold.

The perishable level ranges from 0.02 to 2.0% and it depends on the technical facilities of fixed storage houses (warehouses, silos, deposits, etc...) or of mobile storage houses (refrigerator car, isothermal, auto-isotherm, auto-refrigerator), on the observance of the optimum regime of technical and economic circulation (Diaconescu, I., 2002, pages 179-180).

During the technical and economic circulation, as a consequence of internal and external factors, there may be a number of processes (physical, chemical, biochemical and microbiological) and changes within the food products.

The specialty literature shows that the structure of fruit consumption on species is scarce and as a result of the storage conditions for apples,

pears, quince, which cover most of the consumption in the period from November to May.

Depending on the perishable degree, the fruits are kept for a period of time in deposits.

The fruit storage conditions for temperature range between -1.... 15 º C, the relative humidity varies between 75-95%, and as other conditions we mention: space ventilation, SO2 treatment and usage of 25 – 50 kg bags.

CONCLUSIONS

The importance of fruit consumption is due to special sensory properties and to nutrient substances they contain.

In order to maintain the quality characteristics of fruits, it is necessary to design, build or modernize the storage houses.

The fruits are produced with a high water content and therefore they are perishable, which leads to a generally short storage period.

Suggestions:
- the possibility to extend the storage period;
- the modernization of storage houses;
- the emphasis on the organic production;
-choosing the proper packaging for the temporary or long-term preservation.

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