

TECHNICAL ASPECTS CONCERNING THE PRESERVATION OF PEPPERS IN DIFFERENT STORAGE CONDITIONS

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Abstract

The research concerns the study of the ability to maintain nutritional and commercial quality to peppers in different temperature storage conditions. During the three years of experimentation were used varieties: 'Buzau 10', 'Galben superior' and 'Bianca'. These were stored after proper preparation, at ambient temperature (+20 ... +22°C), refrigerated (+10 ... +12°C) and cold (+3 ... +5°C). The duration of storage, the weight (mass) and losses degradation and evolution of chemical components caused by the 9 variants yielded conclusive conclusions to 'Galben superior' and 'Bianca' cultivars for which experimental three-year cycle. It was found that the losses observed during storage are influenced by storage temperature and climatic conditions for the development of cultivars that have varied significantly in the three years of experimentation. The experimental variants were considered existing conditions in the family farms

Key words: peppers, quality preservation, storage, family farms.

INTRODUCTION

Maintaining the quality of horticultural products after harvest, pick still many problems especially for family farms, where the technical knowledge and the material is poor. Research has allowed the determination of the technical aspects of storage cultivar pepper in different storage conditions may be applied in family farms.

Pepper is perishable product storage. Pepper cultivars are grown in almost all households and vegetable farms for their own consumption and / or for sale. The two main factors responsible for maintaining the quality of peppers are: varieties resistance to storage and thermal conditions in storage areas. A series of researchers (Linda J. Haris 1998; Cantwell, I. M. and R.F. Kasmire 2002; Jamba, A. and B. Carabulea 2004; Thompson, F. J. and Crisosto H. C.2002) have studied the behavior of pepper in different storage conditions

Recent research conducted by "Horting" institute has watched highlighting storage resistance of some varieties grown in our country and the influence of temperature on the quality and duration of maintaining quality of

peppers. The results may be indicative benchmarks for family farms with peppers in vegetable assortment.

MATERIALS AND METHODS

The study was taken in four varieties of peppers ('Buzau 10', 'Galben superior' and 'Bianca') grown in the same farm and placed in storage. Storing was carried out in three different conditions: ambient temperature (+20...+22°C), refrigerated spaces (+10...+12°C) and cold conditions (+3...+5°C). It covers such major environmental conditions in which the products in question may be kept in the household. Temporary storage after harvesting in different areas is carried out at ambient temperature, keeping the average in refrigerators or refrigerated rooms and long-lasting in cold storage facilities. It were determined the duration of preservation and level of weight (mass) and decay losses and the evolution of some chemical components during storage. The scheme of research organization that included nine experimental variants based on onion varieties and storage conditions is presented in table 1.

Table 1. The organization scheme of research with peppers

Variant	Variety	Storage conditions
V1	Buzau 10	Ambient temp. (+20...+22°C)
V2	- idem -	Refrigeration (+10...+12°C)
V3	- idem -	Cold conditions (+3...+5°C)
V4	Galben superior	Ambient temp. (+20...+22°C)
V5	- idem -	Refrigeration (+10...+12°C)
V6	- idem -	Cold conditions (+3...+5°C)
V7	Bianca	Ambient temp. (+20...+22°C)
V8	- idem -	Refrigeration (+10...+12°C)
V9	- idem -	Cold conditions (+3...+5°C)

The main biometric data of peppers are presented in Table 2 and the appearance of chosen varieties in Figure 1.

Table 2. Biometric data

Variety	Length (height) (mm.)	Width (diameter) (mm.)	Shape index	Average mass (g/pcs)
Galben superior	83,8	64,6	1,30	90,99
Buzau 10	69,10	62,9	1,10	74,66
Bianca	77,3	58,8	1,31	89,16



Figure 1. Peppers appearance at the starting of experiments

The preparing stage of peppers for research purpose is illustrated in Figure 2.



Figure 2. Experience with peppers under preparation

RESULTS AND DISCUSSIONS

The average weight of the fruit is a characteristic indicator for every variety. The level of weight and decay losses and sprouting during storage in different temperature conditions are presented in Table 3.

Table 3. Losses accumulated during storage period (%)

Variety and other	Ambient			Refrigeration			Cold conditions		
	Losses (%)			Losses (%)			Losses (%)		
	weight	decay	total	weight	decay	total	weight	decay	total
Galben superior	18,05	0	18,05	8,28	0	8,28	11,84	0	11,84
Buzau 10	8,91	0	8,91	6,26	0	6,26	6,69	0	6,69
Bianca	13,65	0	13,65	7,29	0	7,29	10,48	0	10,48
Mean	13,54	0	13,54	7,28	0	7,28	9,67	0	9,67
Storage time	5 days			10 days			20 days		

The data presented in Table 3 shows that in conditions of ambient temperatures, peppers can be kept up to 5 – 20 days (depending on variety), with average total losses of 13.60%. Buzau10 variety had the lowest total losses and ‘Galben superior’ variety showed the highest values of total losses. ‘Buzau 10’ variety proved to have better resistance to storage mainly because of reduced decay losses. Appearance of ‘Buzau 10’ variety of storage at ambient temperature is shown in Figure 3.



Figure 3. ‘Buzau 10’ variety after storage under ambient conditions

In refrigerated spaces peppers was stored for 10 days with 9.85% average total losses. In such conditions ‘Buzau 10’, was the most resistant cultivar with 8.28% total losses. On second place was situated ‘Galben superior’ variety, with total losses below the average of the three varieties studied. Last place was occupied by ‘Bianca’ variety, which cumulated the highest weight and decay losses. Appearance of peppers variety of storage at refrigerated temperature is shown in Figure 4.



Figure 4. Peppers variety after storage under refrigerated conditions

In cold conditions, the average total losses raised to 10.61% after 20 days of storage. Thus the variety 'Buzau 10' were recorded the lowest weight and decay losses cumulating 6.69% total losses, the variety 'Bianca' had about 10.61% and the variety 'Galben superior' had about 11.84%. Appearance of peppers variety of storage at cold temperature is shown in Figure 5.



Figure 5. Peppers variety after storage under cold conditions

Content and evolution of some chemical components during storage are presented in Table 4. The data presented on Table 4 shows that initially the peppers had 6.5 to 8.0% soluble solids content, from 0.10 to 0.23% treatable acidity, from 1.72 to 3.18% total sugar and from 121.32 to 219.32 mg/100g vitamin C, depending on the variety. 'Buzau 10' variety had the highest content of soluble solids, treatable acidity, total sugar and vitamin C, while those of 'Galben superior' variety were recorded the lowest values of all components.

Table 4. Level and evolution of chemical components in peppers variety

Var.	Variety	Storage temp. (°C)	Soluble solids (%)	Acidity (%)	Total sugar (%)	Vitamin C (mg/100g)	
V1	Galben superior	initially	6,5	0,15	2,22	121,32	
		20-22°	6,1	0,14	2,18	36,70	
		10-12°	5,1	0,13	1,89	19,57	
V3	Buzau 10	3-5°	4,5	0,10	1,72	168,22	
		initially	8,0	0,22	3,18	219,32	
V4	Buzau 10	20-22°	7,2	0,22	2,85	144,57	
V5		10-12°	6,5	0,12	2,45	140,74	
V6		3-5°	6,2	0,23	2,38	157,20	
V7		Bianca	initially	6,5	0,19	2,79	168,36
			20-22°	6,0	0,14	2,40	65,20
V8	Bianca	10-12°	5,5	0,18	2,44	104,32	
V9		3-5°	4,7	0,12	2,09	122,97	

Main chemical components evolution was different from an experimental variant to another. The content of soluble solids had a downward trend for all the varieties in particular to the peppers stored in cold conditions. Values lower than initial ones have been recorded also by 'Buzau 10' variety (V5) and 'Bianca' variety (V8) stored under refrigeration conditions. 'Buzau 10' variety, considered the healthiest (lowest decay losses) showed a decrease in soluble solids and total sugar content in refrigeration and cold storage conditions. For 'Buzau 10' variety the soluble solids content remained high in refrigerated and cold conditions (V5 and V6) and for 'Bianca' variety only in refrigerated conditions (V9). Acidity of peppers presented both slight increases and decreases depending on the variety and on storage conditions. The peppers maintained in general the initial acidity content in ambient and cold conditions and presented mild reductions in refrigerated one, the lowest values being recorded by 'Galben superior' variety (V3) and 'Bianca' variety (V9).

On ambient conditions total sugar content was maintained at high values at 'Galben superior' variety (V1) and 'Buzau 10' (V4) and had a decreasing trend at 'Bianca' (V7). In refrigerated conditions all varieties of peppers were significant reductions of total sugar content. And in cold conditions peppers from 'Buzau 10' variety (V6) and 'Bianca' variety (V9) had a total sugar content lower than initially, while the 'Galben superior' variety (V3) maintained a high sugar content.

The amount of vitamin C in peppers strongly decreased during storage at all varieties, but bet on in different proportions depending on variety and storage conditions. The sharpest decrease occurred in the 'Galben superior'

variety of the genus to which vitamin C content decreased by 62-90% depending on storage conditions. Lowest losses of vitamin C were found in peppers of the genus 'Buzau 10' they were 30-50%, depending on storage conditions. Variety 'Bianca' has dropped by 44-74% vitamin C content according to storage conditions. In ambient conditions 'Galben superior' variety had lowest losses of vitamin C, while refrigerated and cold varieties 'Buzau 10' and 'Bianca' showed the lowest losses of vitamin C.

CONCLUSIONS

Maximum storage life of onions was 5 days under ambient conditions (depending on variety), 10 days under refrigeration and 20 days in cold conditions, with average total losses of 13.54%, 7.28 % and 9.67% respectively.

The optimum time to maintain the quality of the sweet is 3 days in ambient conditions, 7 days in refrigerated spaces and 15 days in cold spaces.

Pepper varieties have different behavior in similar conditions of storage. While in variety 'Buzau 10' bet on all storage conditions obtained the best results with the lowest volume loss, 'Galben superior' variety showed great sensitivity higher, posting the biggest losses in both ambient conditions and in cold.

Evolution of the main chemical components

(dry matter, acidity, total sugar and vitamin C) of peppers can be an important indicator of the ability to maintain quality of storing bet on different conditions.

The best results maintain the quality of the peppers variety were obtained 'Buzau 10', which proved the most resistant, the best storage conditions are ensured by freezing at 10-12 °C.

The peppers must be checked daily to notice in advance of any change in appearance or quality and to intervene immediately to remove the causes or effects already produced.

The results have confirmed that the cold storage conditions recommended given the lowest loss (mass and impaired), and that increases shelf life, even up to 20 days in the case of peppers have a perishable high.

REFERENCES

- Cantwell, I. M. and R.F. Kasmire (2002) - Postharvest Handling Systems, Postharvest Technology of Horticultural Crops (Chapter 35), Publication 3311, University of California.
- Jamba, A. and B. Carabulea (2004) - Tehnologia pastrarii si industrializarii produselor horticole, Editura Cartea Moldovei, Chisinau.
- Haris Linda J. (1998) – Peppers Safe Methods to Store, Preserve and Enjoy, Publication 8004, University of California.
- Thompson, F. J. and Crisosto H. C. (2002) - Handling at Destination Markets, Postharvest Technology of Horticultural Crops (Chapter 21), Publication 3311, University of California.