

STUDIES REGARDING THE INFLUENCE OF HEAT WATER TREATMENT ON APPLE FRUIT QUALITY OF GENEROUS AND STARKRIMSON VARIETIES STORED REFRIGERATED

STUDII PRIVIND INFLUENȚA TRATAMENTUL TERMIC CU APĂ CALDĂ ASUPRA CALITĂȚII FRUCTELOR DE MĂR DIN SOIURILE GENEROS ȘI STARKRIMSON PĂSTRATE FRIGORIFIC

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Abstract. Treatment with hot water is used by increasing numbers of organic fruit producers, to prevent the development of pathogens in storage. Also, by exposing the fruit to high temperatures, are diminishes some maturation processes, was reduced ethylene production due to inhibition of enzymes. Before refrigerated at 2⁰C, the apples of varieties Generos and Starkrimson were treated hot water. For not suffer a thermal shock, fruits were initially immersed in water at 30⁰C for 5 minutes, then in water at 50⁰C for 3 minutes. After seven months of cold storage were analyzed physico-chemically, the results were compared with untreated fruit. Qualitative parameters analyzed indicated that treatment with hot water has a significant influence in maintaining quality of apple fruits in cold storage.

Key words: hot water treatment, quality fruits, cold storage

Rezumat. Tratamentul termic cu apă caldă este utilizat în proporție tot mai mare de către producătorii de fructe ecologice, pentru a preveni dezvoltarea de agenți patogeni în depozite. De asemenea, prin expunerea fructelor la temperaturi ridicate, se diminuează unele procese de maturare, fiind redusă producția de etilenă, datorită inhibării unor enzime. Înainte de a fi introduse în celulele frigorifice la temperatura de 2⁰C, fructele din soiurile Generos și Starkrimson au fost supuse unui tratament termic cu apă caldă. Pentru a nu suferi un șoc termic, fructele au fost imersate inițial în apă la temperatura de 30⁰C timp de 5 minute, apoi în apă la temperatura de 50⁰C, timp de 3 minute. După șapte luni de păstrare frigorifică au fost analizate fizico-chimic, rezultatele fiind comparate cu fructele netratate. Parametrii calitativi analizați au indicat faptul că tratamentul termic cu apă caldă a avut o influență deosebită în menținerea calității merelor în depozitul frigorific.

Cuvinte cheie: tratament cu apă caldă, calitate fructe, păstrare frigorifică

INTRODUCTION

The quality of the apples stored refrigerated is estimated by physical-chemical parameters: acidity, dry soluble substance, structo-textural firmness, respiration intensity, degree of hydrolysis of starch (Anghel, 2011).

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The exposure of fruit to high temperature, for short time, is to alleviate some maturation processes.

Ethylene production is reduced due to inhibition of enzymes. Even if, by this treatment, the fruit undergoes a mild heat shock, at the end of the storage period has a high quality fruit from the blank.

In this study we proposed to analyze the influence of heat treatment with hot water on quality of two varieties apple fruit, by statistical interpretation data from physico-chemical analysis, concerning the preserved fruit store.

By comparing the results obtained shall be established if the treatment carried out was of any significance or not statistically.

MATERIAL AND METHOD

The analyzed material was represented by the results of chemical analysis and physical measurements of two varieties of apple, Starkrimson and Generos, stored during by October 2010-April 2011 at the cold storage Sârca, SCDPP Iasi. (Anghel, 2011)

Fruits were applied heat treatment with hot water. For not suffer a heat stroke, fruits were initially immersed in water at 30°C for 5 minutes, then in water at 50°C for 3 minutes.

After seven months of cold storage were analyzed physico-chemically, the results were compared with untreated fruit. (Anghel, 2011)

The results obtained from these determinations have been processed statistically, with Fisher test, variance analysis – using ANOVA, in Excel application. This application is used for testing significant difference between multiple environments. (Oancea, 2007)

Analysis of variance aims to analyse any differences that arise between the variants considered: to study the effect of film treatment on the quality of fruit, compared with blank variant. (Jităreanu, 2006).

Statistical analysis was performed on the results of the following qualitative parameters: acidity, dry soluble substance and structo-texturale firmness.

RESULTS AND DISCUSSIONS

After measurements in April 2011 (tab. 1 and tab. 3), values for quality parameters analyzed, respectively soluble dry substance (⁰Bx), total acidity (g malic acid /100 g product) and structo-textural firmness (UP) were as follows:

Table 1

Results obtained in the last month of storage in storage of fruit from Generos variety

Variant	Repetition 1	Repetition 2	Repetition 3
Soluble dry substance content (⁰Bx)			
Blank	12,0	11,9	12,1
Heat treatment with hot water	14,0	13,9	14,1
Titration acidity content (g malic acid /100 g product)			
Blank	0,36	0,35	0,37
Heat treatment with hot water	0,39	0,40	0,38
Structo – textural firmness value (UP)			
Blank	42	41	43
Heat treatment with hot water	39	40	38

Influence of hot water treatment on fruit quality of Generos variety is presented in tab. 2:

Table 2

ANOVA test results concerning the influence of hot water treatment of apple fruit quality parameters of the Generos variety

Quality parameter	F	F crit	P-value	Influence	Significance
Soluble dry substance	600	7,7086497	0,00001	***	very significant
Titration acidity	13,5	7,708647	0,021312	*	significant
Structo – textural firmness	13,5	7,708647	0,021312	*	significant

Data analysis concerning the influence of heat treatment with hot water on the apple fruit variety Generos (tab 2) reveals that this treatment had a very significant influence on the soluble dry substance content, the coverage probability of 99.9 %, the null hypothesis is rejected because p-value <0.001.

Regarding the content of organic acids and Structo-textural firmness, we can say that hot water treatment applied to apple fruit had a significant influence at a degree of trust of 95% of the test (because p value = 0, 021 312 <p = 0,05). In these cases the null hypothesis was rejected.

Table 3

Results obtained in the last month of storage in storage of fruit from Starkrimson variety

Variant	Repetition 1	Repetition 2	Repetition 3
Soluble dry substance content (°Bx)			
Blank	12,4	12,3	12,5
Heat treatment with hot water	14,8	14,7	14,9
Titration acidity content (g acid malic/100 g product)			
Blank	0,20	0,21	0,19
Heat treatment with hot water	0,23	0,22	0,24
Structo – textural firmness value (UP)			
Blank	38	39	37
Heat treatment with hot water	34	33	35

Table 4

ANOVA test results concerning the influence of hot water treatment of apple fruit quality parameters of the Starkrimson variety

Quality parameter	F	F crit	P-value	Influence	Significance
Soluble dry substance	864	7,708647	0,00000797	***	very significant
Titration acidity	13,5	7,708647	0,021312	*	significant
Structo – textural firmness	24	7,708647	0,00805	**	distinctly significant

In the case the analysis of the influence of heat treatment with hot water of fruits belonging Starkrimson variety (tab. 4), we can see that for the three quality parameters studied were obtained different results.

Therefore, on the soluble dry substance content, the treatment was, of statistical point of view, very significant influence, with a high degree of probability, the null hypothesis is rejected as p value <0.001 .

Of content in the organic acids, heat treatment had a significant influence on the coverage probability of 95% (p value = 0.021312 as $<p = 0.05$). Null hypothesis was rejected.

Was presented a very significant statistical influence of heat treatment on the firmness of fruit. Null hypothesis was rejected at a probability of 99% coverage.

CONCLUSIONS

1. From the statistical analysis performed can be seen that heat treatment with hot water had no influence on the quality parameters studied.

2. Null hypothesis was rejected for all parameters studied the fruit of both varieties, at different degrees of trust of the test.

3. Regarding the treatment effect on content to soluble dry substance, we can say that the point was very significant statistically, the highest trust this test (99.9%), whatever the variety of which came from fruits.

4. Concerning of content to the organic acids, the influence was significant at a probability of 95% for both varieties studied

5. The influence of hot water over structo-textural firmness was different, depending on variety.

6. To the Generos variety is observed significant influence on the coverage at 95% probability and a distinct significant influence of Starkrimson variety, at a 99% probability of coverage.

REFERENCES

1. **Anghel Roxana Mihaela, 2011** - *Studies regarding the effect of heat treatment on fruit quality of apple in cold storage Sârca the SCDP Iași*. *Lucrări Științifice Seria Agricultură*, vol. 53, Iași.

2. **Anghel Roxana Mihaela, 2011** - *The influence of treatment with high temperature applied on apple fruits, in order to maintain their quality during cold storage*. *Lucrări Științifice Seria Agricultură*, vol. 54, Iași.

3. **Jităreanu G, 2006** – *Tehnică experimentală*. Editura "Ion Ionescu de la Brad" Iași.

4. **Oancea Servilia, 2007** – *Ghid de prelucrare rapidă a datelor experimentale*. Edit. Performantica Iași.