

EFFECT OF FREEZING ON THE CHEMICAL COMPOSITION OF STRAWBERRIES

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INTRODUCTION

One of the most popular ways of berries preservation is freezing. Freezing prolongs the shelf life of berries, inhibits the growth of microorganisms and helps maintain their nutritional value. Most vitamins and other biologically active compounds remain in frozen products.

The object of the investigation was fresh and frozen strawberries (*Fragaria × ananassa* (Duchesne ex Weston) Duchesne ex Rozier) 'Rumba', 'Asia', 'Sonsation' and 'Malwina' cultivars grown on a farm in Joniškis district, Lithuania.



'Rumba'



'Asia'



'Sonsation'



Malwina

The research aim was to evaluate changes in the chemical composition of strawberries during the freezing process.

MATERIALS AND METHODS

3 kg of fresh strawberries of each cultivar were placed in polyethylene bags for refrigeration (3 bags of 1.0 kg each) and frozen at -37 °C. In the fresh and frozen strawberries were determined amount of dry matters, soluble solids, ascorbic acid by standard methods. The total phenolic content was determined spectrophotometrically using the Folin-Ciocalteu reagent. Total anthocyanins were established by measurement of absorbance at 538 nm with two-ray UVS-2800 spectrophotometer. The antiradical activity was determined using the 2,2-diphenyl-1-picrylhydrazyl free radical (DPPH*) method.

The data analysis was carried out with STATISTICA version 7 software. The results were analysed using two-way analysis of variance (ANOVA). Fisher's Least-Significant-Difference test (LSD) was applied to the experimental results to assess significant differences between mean values at the significance level of $p < 0.05$.

RESULTS

Table 1. Dry matters, soluble solids and ascorbic acid content of fresh and frozen strawberries (fw)

	'Rumba'	'Asia'	'Sonsation'	'Malwina'
Dry matters %				
Fresh	16.80 c*	16.06 abc	16.19 abc	15.87 ab
Frozen	16.32 bc	15.32 a	15.89 ab	15.65 ab
Soluble solids %				
Fresh	9.03 b	10.23 c	11.17 d	14.27 e
Frozen	8.27 a	10.17 c	11.00 d	14.23 e
Ascorbic acid mg 100g⁻¹				
Fresh	37.12 a	55.30 e	48.37 cd	50.29 d
Frozen	35.02 a	34.96 a	43.80 b	47.18 c

*Significant differences ($p < 0.05$) are marked by different letters.

Table 2. Total phenolics, anthocyanins content and antioxidant activity of fresh and froze strawberries (fw)

	'Rumba'	'Asia'	'Sonsation'	'Malwina'
Total phenolics mg GAE 100g⁻¹				
Fresh	158.97 c*	216.92 h	212.19 g	172.67 f
Frozen	154.93 b	166.22 e	139.58 a	163.45 d
Total anthocyanins mg 100g⁻¹				
Fresh	0.72 a	1.05 c	0.85 b	0.88 b
Frozen	0.67 a	1.03 c	0.83 b	0.86 b
Antioxidant activity %				
Fresh	71.82 h	69.45 f	70.23 g	67.4 e
Frozen	58.21 c	65.76 d	47.42 a	56.48 b

*Significant differences ($p < 0.05$) are marked by different letters.

CONCLUSIONS

The freezing process reduced the nutritional value of the studied cultivars of strawberries although some of the changes were not significant. The highest changes were observed for the 'Sonsation' cultivar strawberries.