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STATISTICAL ANALYSIS OF COLOUR AGENT CONTENT DATA

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Abstract

We studied how the colour agent content of paprika powders changed during storage, using different storage conditions. Different quality Hungarian, Peruvian and Chinese paprika powders were investigated. The initial colour agent content of samples changed between 59 and 219 ASTA unit. The different quality paprika powder samples were stored in fridge, at room temperature using transparent packing and at room temperature packed in tinfoil. The colour agent content of samples was measured through 5 months. The measured values were analysed using ANOVA. The storage condition and storage time influenced the colour agent content decrease significantly in the case of Hungarian, Peruvian and Chinese paprika powder too. The decrease of colour agent content after 5 months was averagely 18% in case of Hungarian powders, the change was significant after 4 months, 25% in case of Chinese powders, the change was significant after 3 months and it was 11% in case of Peruvian powders, the change was significant after 4 months. The reduction of colour agent content was the least in case of samples stored in fridge. It was averagely 6 % for Hungarian, 12% for Chinese and 8 % for Peruvian paprika powders.

Key words: (maximum 6): papika powder, colour agent content, storage

INTRODUCTION

The use of natural food colours is preferred of artificial dyestuffs for modern alimentary purposes. Paprika is a spice plant grown and consumed in considerable quantities world-wide, and also used as a natural food colour. Hungarian paprika powder is still regarded as a ”Hungaricum” today. Paprika is cultivated in areas of the world such as Spain, China, South Africa and South America, where the weather is favourable for the growth of this plant and for the development of its red colouring agents. The large number of hours of sunshine allows the paprika to ripen on its stock, so that the basic material reaching the processing mills has a high dyestuff content. Hungarian paprika has a unique aroma and a specific smell, but the production of powder with a good red colour is a considerable problem. The colour of paprika powder is very important, because the consumer concludes its colouring power based on its colour. The colouring power of paprika powders is determined by quality and quantity of colouring agent of paprika squarely. The colour agent content of powders decreases in the curse of storage and is influenced by steps of the processing. The dehydration is the most critical step of the processing. The effect of the heat impairs the colour agent, aroma and flavour substratum of paprika. Several researchers investigated the optimal parameters of dehydration. (Minguez-Mosquera et al., 2000; Ramesh et al., 2001; Shin et al., 2001; Doymaz and Pala, 2002; Kim et al., 2004; Perez-Gamez et al., 2005; Simal et al., 2005). Topuz et al. (2011) compared the Refractance Window (RWD) method to dry paprika in comparison with freeze drying, hot-air oven drying, and natural convective drying methods. It was depicted that the least colour agent content decrease was in the case of natural convective drying method. The colour agent content reducing is effected by condition of storage. There are many papers about the changes in the colour agent content of the paprika storage processes (Park et al., 2007, Banout et al., 2011, Topaz et al., 2011, Chetti et al., 2014).

We investigated how the colour agent content of paprika powders changed during storage, using different storage conditions.

MATERIAL AND METHOD

The measured paprika powder samples

We investigated different quality Hungarian, Peruvian and Chinese paprika powders. The Table 1 shows the investigated powder samples and their colour agent content.

Table 1

The parameters of stored paprika samples

Samples	Initial colour agent content (ASTA unit)				
Hungarian paprika	190	219	157	196	
Chinese paprika	149	110	121	143	164
Peruvian paprika	57	67	80		

Measurement of colour agent content

The ASTA (American Spice Trade Association) unit was used to give the colour agent content of paprika powders according to MSZ EN ISO 7541. The acetone extracts of paprika powder was measured by photometer at 460 nm. The ASTA unit was calculated using following formula:

$$\mathrm{ASTA} = \frac{\text{Absorbance} \cdot 16.4 \cdot \mathrm{f}}{\text{weight of sample (g)}},$$

where $\boldsymbol{f}$ is a correction factor for the used photometer.

The storage conditions

The powders were stored 3 different storage conditions:

- in fridge,
- at room temperature using transparent packing,
- at room temperature packed in tinfoil.

The colour agent content of samples were measured a monthly for five months.

RESULTS AND DISSCUSIONS

To establish whether the storage time and storage condition influences the colour agent content decrease analysis of variance (ANOVA) was performed. The result of the Bartlett and Cochran-test confirmed the homogeneity of the variances, the Shapiro-Wilk test was applied to control the normality.

The result of ANOVA is shown in Table 2. We can see, that the storage time and storage condition influenced the value of colour agent content decrease significantly.

Table 2

The result of ANOVA

Factor	Samples	F value	Significant level
Storage condition	Hungarian	47,97	0,00
	Chinese	10,29	0,00
	Peruvian	7,02	0,00
Storage time	Hungarian	18,39	0,00
	Chinese	30,81	0,00
	Peruvian	4,67	0,00

Effect of the storage time

In the Fig. 1 we can see the effect of the storage time in case of Hungarian powders. The reduction of colour agent content after 5 months was averagely 18% the change was significant after 4 months. The Fig. 2 shows the effect of the storage time in case of Chinese samples. The colour agent content decrease was averagely 25 % after 5 months, the changing was significant after 3 month.

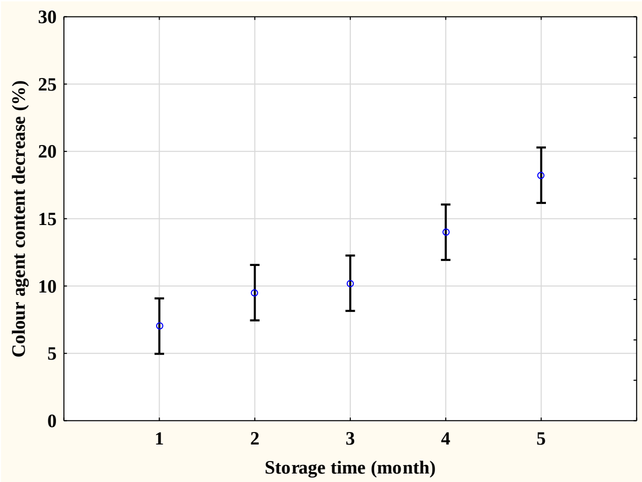

Fig. 1 The effect of the storage time on the colour agent content decrease in case of Hungarian powders (averages with conf. int. at a level 95%)

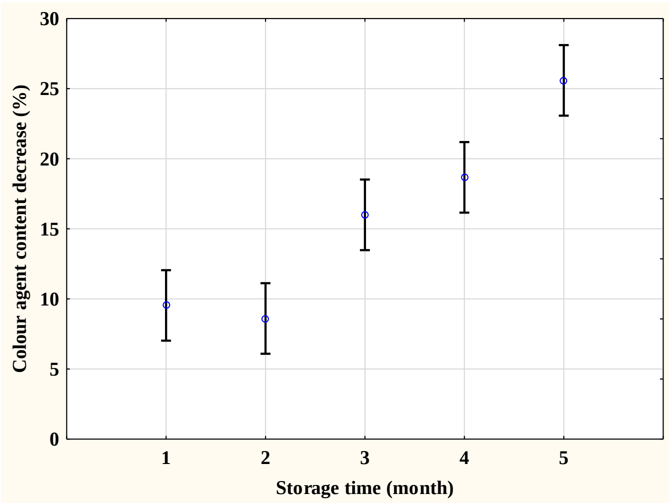

Fig. 2 The effect of the storage time on the colour agent content decrease n cose of Chinese powders (averages with conf. int. at a level 95%)

The Fig. 3 present the change the colour agent content during storage in case of Peruvian samples. We can see that the reduction was averagely 25% after five months, the variation was significant after 3 months and after 5 months. The changing didn't significant between 1 and 2 months, as well as between 3 and 4 months.

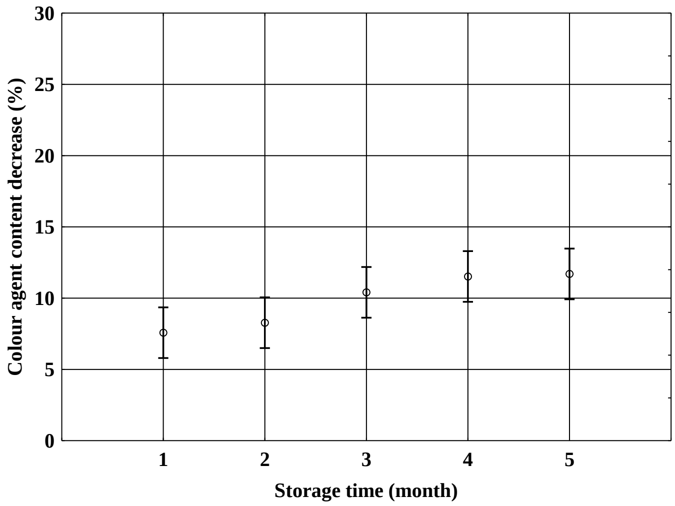

Fig. 3 The effect of the storage time on the colour agent content decrease in case of Peruvian powders (averages with conf. int. at a level 95%)

Effect of the storage time

In the Fig. 4 –Fig. 6 we present the effect of the storage condition on the colour agent content decrease. We can see that the Hungarian paprika samples which were stored in room temperature using transparent lost its colour agent content to a large degree, the change was the least in the case of powders stored in the fridge.

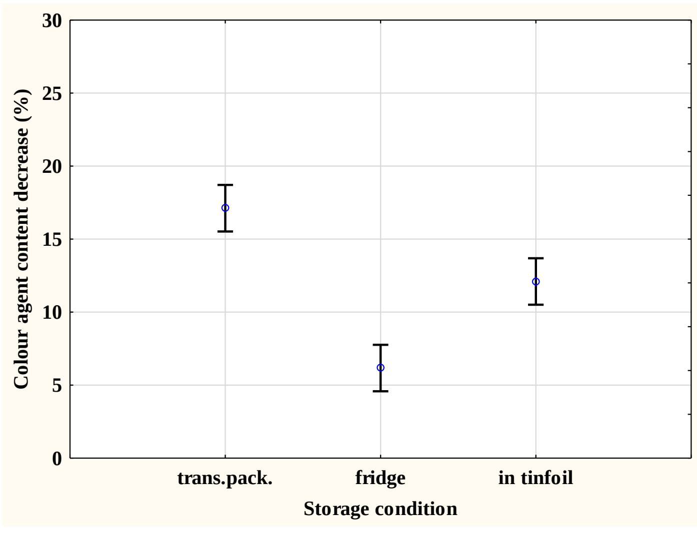

Fig. 4 The effect of the storage condition on the agent content decrease in case of Hungarian powders (averages with conf. int. at a level 95%)

The Fig. 5-Fig 6. show the similar results. There is no significant difference the samples stored in room temperature. The change was the least in the case of powders stored in the fridge

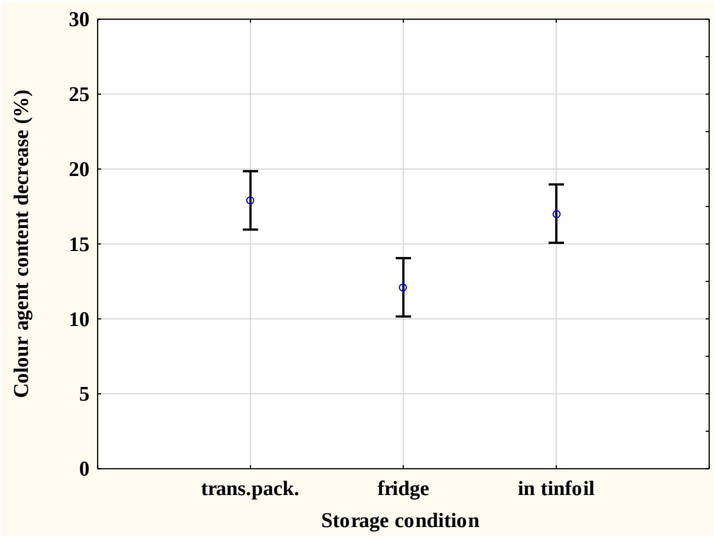

Fig. 5 The effect of the storage condition on the agent content decrease in case of Chinese powders (averages with conf. int. at a level 95%)

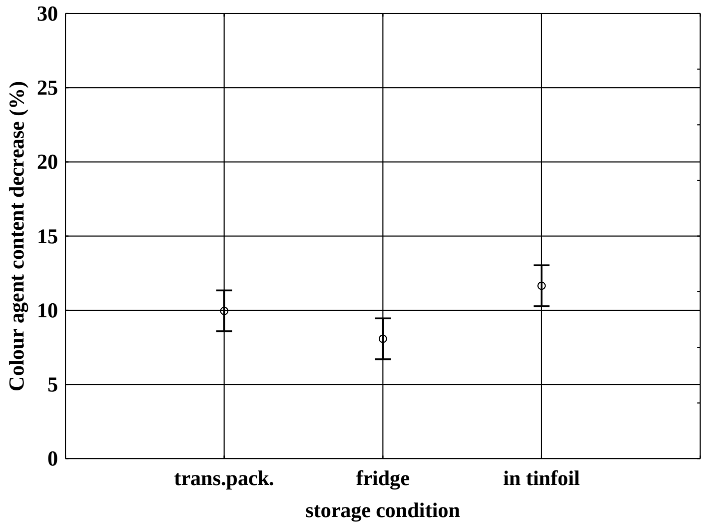

Fig. 6 The effect of the storage condition on the agent content decrease in case of Peruvian powders (averages with conf. int. at a level 95%)

CONCLUSIONS

- The storage condition and storage time influenced the colour agent content decrease significantly.
- The decrease of colour agent content after 5 months was averagely 18% in case of Hungarian powders, the change was significant after 4 months, 25% in case of Chinese powders, the change was significant after 3 months and it was 11% in case of Peruvian powders, the change was significant after 4 months.
- The change of paprika colour agent content was the least in the case of samples stored in fridge. The low temperature (4-6 °C) is suitable to store the paprika powders.

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