

Pascalized coconut water with coffee extract - sensory and microbial quality

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The aim of the research was to determine the shelf-life of high-pressure coconut water samples enriched with coffee extract. The second objective was to determine changes in sensory evaluation of samples during the storage test.

The raw product was filled in plastic bottles made from PET elastic material. Bottles were treated by high pressure treatment at parameters 600 MPa with holding time 3 minutes at Beskyd Fryčovice joint stock company with machinery [1].

The coffee coconut water was stored refrigerated at 10 °C for 4 weeks and was sensorially and microbially evaluated during this storage.

To determine the total number of microorganisms, the GTK AGAR broth was used and the GKCH AGAR broth was used to determine the yeast and mold.

Selected sensory descriptors were evaluated for the pleasantness of the appearance (the appearance), the pleasantness of the color (hereinafter only color), the pleasantness of the scent (the fragrance), the intensity of the coffee scent, the intensity of the coconut scent, the pleasantness of the taste (hereinafter only the taste), the intensity of the coffee taste, the intensity of coconut flavor, the intensity of the odor and the overall impression. In order to evaluate the sensory characteristics mentioned above, a scale method with a graphical scale was chosen, when the results of the individual marks were recorded on a 100 mm long scale (scale 0-100 points, appearance, color, smell, taste and overall impression 0 = excellent, 100 = bad coffee intensity, intensity of coconut smell, intensity of coffee taste, intensity of coconut taste, odor intensity 0 = absent, 100 = very strong).

There was made the statistical evaluation of sensory evaluation results. Normality test was performed: Shapiro-Wilk test at significance level $\alpha = 0.05$. The results were subjected to the distance test: Dean-Dixon test ($Q_{crit} = 0.361$ for $n = 13$, $Q_{crit} = 0.376$ for $n = 12$; $Q_{crit} = 0.392$ for $n = 11$, $Q_{crit} = 0.437$ for $n = 9$; significance level $\alpha = 0.05$).

Tables 1A and 1B show the results of determination of the dry matter content, basic composition and pH of the test coconut water with added coffee extract. It is obvious that the dry matter of the beverage is extremely low. Dry matter is made up of two-thirds of carbohydrates. The rest forms ash and low protein content. Acidity expressed at a pH value is higher than the pH limit of 4.5 below which spores of pathogenic microorganisms do not germinate. Therefore, a further limiting parameter that prevents spore germination,

which is the product maintenance during distribution and sale below 8 °C, needs to be applied after pressure application.

Tab. 1A Dry matter, water content and coconut water acidity with added coffee extract

parameter	value
dry matter (%)	3.38±0,04
water content (%)	96.63±0,04
pH (-)	4.84

Tab. 1B Base composition of the product (sample)

Nutrition substance / sample		value (g/100g)
energy	kJ/100g [*])	50 [*])
fats		-
Saturated fatty acids		-
sacharides		2.8
from that sugars		28
fibres		-
proteins		< 0.5
salt		0.02
Dry matter		3.38
ash		0.4

The results of the microbiological assessment of coconut-coffee water during the storage experiment are shown in Table 2. It is clear from the table that over the monitored time, the total number of micro-organisms is very low and does not have a growth tendency. The yeast and mold content is completely zero for the entire shelf life. It can be stated that the microbial quality of the tested coconut-water water is excellent throughout the monitored time.

Tab. 2 Microbiological evaluation of coconut-water during storage

Storage time (days)	Total microorganisms counts (CFU/g)	Yeast and molds (CFU/g)
0	15	0
6	12	0
13	600	0
25	40	0
33	30	0

Sensory evaluation of coffee coconut water during storage was made every week. Appearance, color, smell, taste and overall impression were evaluated positively, none of these descriptors exceeded 50 points (appearance, color, smell, taste and overall impression 0 = excellent, 100 = very bad). The resulting rating ranged from 28 to 31 points, a color rating of 24 to 31 points, a taste rating of 33 to 46 points and an overall impression rating of 39 to 45 points. The odor evaluation revealed very strong). A statistical survey has shown that during storage, except for the smell and intensity of the coffee flavor, there have been no significant changes in the above sensory descriptors.

Conclusions

Dry matter, basic composition and pH

Dry drink is extremely low, 3.38%. Dry matter is made up of two-thirds of carbohydrates. The rest forms ash and low protein content. Acidity expressed at a pH value is higher than the pH limit of 4.5, below which spores of pathogenic microorganisms do not clear. Therefore, a further limiting parameter that prevents spore germination, which is the product maintenance during distribution and sale below 8 °C, needs to be applied after pressure.

Microbial quality

The total number of microorganisms, molds and yeasts during the monitored period did not exceed the limit of 10^3 /g. It is therefore a microbial safe food, provided it is cooled by distribution and sale at temperatures up to 8 °C.

Sensory evaluation

Appearance, color, smell, taste and overall impression were evaluated favorably, as none of these descriptors were more than 50 points. For a sample of coffee coconut water, a low odor intensity was evaluated throughout the storage period. The assessors rated the coffee scent and coffee flavor as very intense. Coconut flavor and coconut flavor were strongly suppressed with added coffee extract, rated as low-intensity. A statistical survey has shown that during storage, except for the smell and intensity of the coffee flavor, there have been no significant changes in the above sensory descriptors.

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[1] <https://www.hiperbaric.com/en/hiperbaric55>

[2] Laknerová I., Urban M., Rutová E., Rysová J., Pinkrová J., Novotná P., Houška M., Landfeld A., Coconut water with coffee extract, Research report FRIP Nr. 6/320-330/2018