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EVALUATING SOME SENSORIAL, PHYSIC-CHEMICAL AND MICROBIOLOGICAL CHARACTERISTICS OF PEAS PRESERVED BY USUAL METHODS

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Abstract

In the present study were evaluated some sensorial, physic-chemical and microbiological characteristics of frozen and canned peas, when compared with fresh peas. The sensorial analysis consisted in aspect, aroma and texture evaluation; the physic-chemical parameters analysed were: pH and water activity and the microbiological parameter was total plate count. All samples were purchased from the market, fresh peas in pod, frozen peas packed in plastic bags, in air atmosphere and canned peas packed in glass recipients, in water. Sensorial analysis was made by untrained panellists. All samples were smashed into a Stomacher before analysing from the physic-chemical and microbiological point of view. pH was determined using a INOLAB 720 WTW series pH-meter equipped with a Sen Tix Sp Spear immersion electrode and water activity was analysed using a Novasina LabMaster AW device. Total plate count was evaluated using SR ISO 4833. Results showed that fresh peas had the highest scores for aspect and texture and the most tasteful sample was canned pea. Most acid samples were those of canned peas and most basic ones were those of frozen peas. Water activity registered the highest value for frozen peas and the lowest for fresh peas. Total plate count had the lowest values for canned peas, followed by fresh and frozen peas.

Keywords: *canning, freezing, pea, total plate count, water activity*

INTRODUCTION

Fruits and vegetables are live tissues harvested at various stages of growth and development, have tender texture, contain high moisture content (60% - 95%) and water activity, lose water to the surrounding atmosphere, and continue respiration, which produces heat and water at the expense of food reserve, carbohydrates, proteins, lipids, etc., which were otherwise replaced by photosynthates and nutrients supplied by the plant before harvest [6].

Postharvest period begins at the separation of plant organ used as food from the medium of its immediate growth or production, and ends when it enters the process of preparation for final consumption of further preservation [5].

Fruits and vegetables are consumed in fresh, minimally processed, and processed forms (canned, frozen, dried, preserves, and fermented products). Raw material quality influences the quality of processed fruit and vegetable products as quality can only at best be maintained and not improved by processing [1].

Quality attributes normally used for raw materials, as well as for final products, are physical (size, firmness, presence or absence of seeds, etc.), compositional (natural sugars and volatiles), nutritional (vitamins, antioxidants, and functional components), and sensory (colour, texture, taste, flavour, and odour) [3, 4, 7, 8].

Quality evaluation consists of measurement of appearance, texture, flavour, nutritive value, and safety of the produce. Safety aspects need to be considered first before all other quality attributes [6].

Green garden peas are eaten before reaching physiological ripeness, fresh or preserved. Peas are rich in carbohydrates (12.5 to 14%), proteins (6 to 8.4%), lipids (0.6%), fibres (6%) and mineral substances (over 0.9%). Total moisture value is 74 to 76% and energetic value is 780 – 790 kcal/kg (960 kcal/kg according to Mincu, I. et all, 1984) [2].

MATERIAL AND METHOD

We evaluated some sensorial, physic-chemical and microbiological characteristics of frozen and canned peas, when compared with fresh peas. The sensorial analysis consisted in aspect, aroma and texture evaluation; the physic-chemical parameters analysed were: pH and water activity and the microbiological parameter was total plate count.

All samples were purchased from the market, fresh peas in pod, frozen peas packed in plastic bags, in air atmosphere and canned peas packed in glass recipients, in water.

Sensorial analysis was made by untrained panellists.

All samples were smashed into a Stomacher before analysing from the physic-chemical and microbiological point of view.

pH was determined using a INOLAB 720 WTW series pH-meter equipped with a Sen Tix Sp Spear immersion electrode and water activity was analysed using a Novasina LabMaster AW device. Total plate count was evaluated using SR ISO 4833.

RESULTS AND DISCUSSIONS

Sensorial characteristics

Arithmetic and weighted averages of the three sensory parameters analysed for pea samples are presented in table 1.

Table 1. Arithmetic and weighted averages of the three sensory parameters analysed for pea samples

Sample	Panellist name	Quality indicators			Weighted average	Final rating
		Aspect	Taste – aroma	Texture		
Fresh pea	Chiriţă Elena	4	4	3	3.65	3.965
	Voinea Andreea	4	5	5	4.85	
	Cuc Cristiana	4	5	5	4.85	
	Marin Gabriela	5	5	4	4.65	
	Popa Anamaria	5	4	5	4.5	
	Grădinaru Adriana	5	4	5	4.5	
	Neacşu Dragoş	4	4	5	4.35	
	Dobrea Nicuşor	5	4	4	4.15	
	Năstase Raluca - Andreea	5	4	4	4.15	
	Hergan Vasilica	5	4	5	4.5	
Arithmetic average		**4.6**	**4.3**	**4.5**	-	**-**
Frozen pea	Chiriţă Elena	4	3	4	3.5	3.63
	Voinea Andreea	5	5	5	5	
	Cuc Cristiana	5	4	5	4.5	
	Marin Gabriela	5	4	4	4.15	
	Popa Anamaria	5	4	4	4.15	
	Grădinaru Adriana	4	5	5	4.85	
	Neacşu Dragoş	4	2	4	3	
	Dobrea Nicuşor	4	4	4	4	
	Năstase Raluca - Andreea	5	2	4	3.15	
	Hergan Vasilica	4	4	2	3.3	
Arithmetic average		**4.5**	**3.7**	**4.1**	-	**-**
Canned pea	Chiriţă Elena	3	3	4	3.35	3.5
	Voinea Andreea	4	5	5	4.85	
	Cuc Cristiana	4	5	5	4.85	
	Marin Gabriela	4	4	3	3.65	
	Popa Anamaria	4	3	4	3.5	
	Grădinaru Adriana	4	5	4	4.5	
	Neacşu Dragoş	3	3	2	2.65	
	Dobrea Nicuşor	4	4	3	3.65	
	Năstase Raluca – Andreea	4	4	4	4	
	Hergan Vasilica	4	4	3	3.65	
Arithmetic average		**3.8**	**4**	**3.7**	-	-

It can be observed that the higher value of the final rating was registered for fresh pea and the lowest for canned pea samples. From the aspect point of view, fresh and frozen pea samples had very similar values (4.6 and 4.5), while canned pea have a lower value (3.8). Regarding taste and aroma, the highest value was obtained for fresh pea (4.3), followed by canned pea (4.0) and frozen pea, with the lowest value (3.7). Best texture was registered, as expected, for

fresh pea (4.5), followed closely by frozen pea (4.1). Canned pea samples had the lowest value of arithmetic average for texture (3.7).
All above observations can be explained by the fact that thermic treatment during freezing and canning technologies is responsible of some chemical and textural modifications in green vegetables, as a result of partial breaking of the cell wall. Thermic treatment induces chlorophyll degradation, leading to processed green vegetables that have a different colour compared with raw material.

Physic-chemical characteristics

The pH and water activity values for pea samples analysed during experiments are presented in figure 1 and 2.
By analysing figure 1, it can be observed that frozen pea have the higher pH value (7.04), followed by fresh pea (6.67) and canned pea, with the lowest value (5.77). Water activity, as it can be seen in figure 2, have very similar values for frozen and canned pea samples (0.978 and 0.977). Fresh pea samples had the lowest water activity value (0.967).

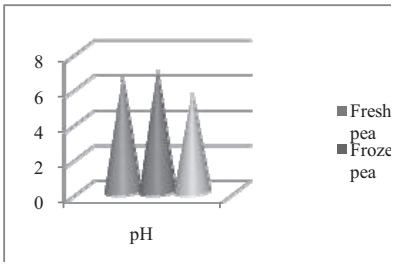

Fig.1. pH values for pea samples analysed

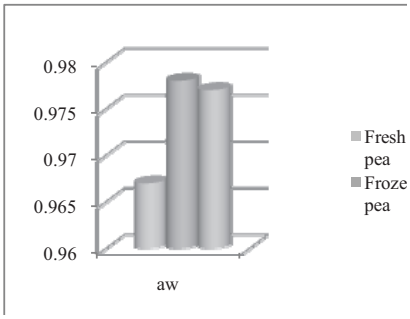

Fig.2. Water activity values for pea samples analysed

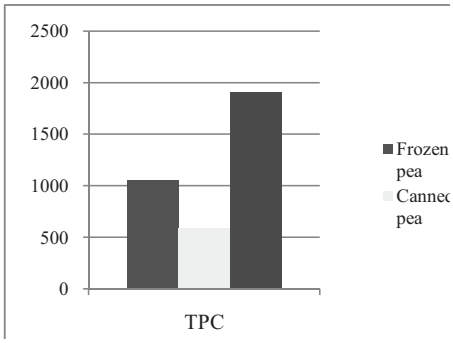

Fig. 3. Total plate count for pea samples analysed

Microbiological characteristics

Figure 3 presents total plate count for pea samples. It can be observed that the lowest microbial load was registered for canned pea samples, which confirms the efficacy of thermal sterilisation during canning technology. Frozen pea samples had a total plate count value lower than fresh pea samples. This can be explained by the fact that preliminary treatments during freezing technology have microbiostatic and sometimes even microbicide effect.

CONCLUSIONS

From the analyses performed in this study can be drawn the following conclusions:
- the highest value of the final sensorial rating was registered for fresh pea and the lowest one for canned pea samples. This can be explained by the fact that thermic treatment during freezing and canning technologies is responsible of some chemical and textural modifications in green vegetables, as a result of partial breaking of the cell wall;
- frozen pea have the highest pH value and canned pea the lowest;
- water activity values varied in very narrow limits for all pea samples analysed;
- the lowest total plate count value was obtained for canned pea, which confirms the efficacy of thermal sterilisation during canning technology. Frozen pea samples had a total plate count value lower than fresh pea samples and this can be explained by the fact that preliminary treatments during freezing technology have microbiostatic and sometimes even microbicide effect.

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