

## MODIFICATIONS OF THE VITAMIN CONTENT OF SOME FOOD PRODUCTS PRESERVED BY FREEZING AND STERILIZATION

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### ABSTRACT

*No matter of the preservation technique, all the food products suffer a series of influences during the storage period, which, if they are known, it can be, prevented the diminution of the commercial and nutritive value of food products.*

*A comparative study of the content in the main vitamins of some vegetables preserved by sterilization and freezing, proves the diminution of the vitamin losses by using "the cold" as a preservation method.*

### KEY WORDS:

food products, preservation, sterilization,  
freezing, vitamin content

### 1. INTRODUCTION

Numerous agricultural raw materials and food products are easily altered due to the enzymatic activity and microorganisms, imposing to the consumption a seasonal limited nature.

In order to remove this shortcoming it resorts to the utilization of some preservation techniques, which relatively stabilize the properties of the product prolonging its preservation and commercial durability.

Deciding upon the preservation method for a food product depends on many elements:

- the compatibility of the product with the preservation method (some preservation methods can be applied for most of the food products: freezing, thermal treatment etc., and some other methods can be applied only for certain products: smoking, natural acidification);
- economical considerations (when choosing the preservation method, a decisive element is the influence of the preservation process on the price);
- the present technical equipment (there are preservation methods that do not need special equipment, but there are as well procedures that need certain equipment: cooling, freezing, sterilization, concentration);

- the influence of the preservation process on the food product (there are preservation procedures through which it can be profoundly modified the psycho-sensorial features of the product, while in some other cases, these are preserved undamaged).

Microorganisms are one of the main causes that determine the changes which most of the time are undesirable in the food products. These changes can reduce the nutritive, sensorial and commercial value finally leading to the alteration of the food product. The growing up and the metabolism of the microorganisms are based on complex biochemical processes that are strongly influenced by the environmental conditions, by the nature and the food product composition, as well, by the environmental pH, the nature and the salt concentration etc. The most important environmental element is the temperature. Unlike the enzymes, which reduce a lot from their activity at a temperature close to 0°C, the microorganism have a high level of adaptability, certain species being capable to develop at temperatures below - 18°C or over 70°C.

Freezing is part of the category of the preservation methods that are using low temperatures, and consists of keeping the food products at temperatures lower than the freezing point, usually at -18°...-45°C. Availability of the food products for freezing is obvious, namely: vegetables, fruits, meat products, eggs, milk products, fish.

The percentage of frozen water, the structural and physical-chemical modifications in the texture of the food product depend on the freezing speed and duration, influenced in their turn by the level of the used negative temperature. Most of the frozen products stored at temperature of -18°C, have a medium preservation period of 10 - 22 months, almost the period between 2 crops, with many examples of ranges below and over these limits.

The sterilization consists of the thermal processing of the agricultural raw materials vegetal and animal, in containers that are hermetically closed, at temperatures over 100°C with a determined period of storage. The vegetative and sporulated forms of microorganisms are destroyed by this procedure.

The sterilization temperature and duration depend on the nature of the product, on the type of packing material (metal, glass), on the quantity and the product volume from the container, etc.

No matter of the preservation method, all the food products suffers a series of influences which if are known, can be prevented the reduction of the commercial and nutritive value of the food products. At the same time, it can be removed the exceeded period of the storage duration that is equivalent with loosing its nature of food product.

Qualitative modifications of the frozen products during the storage duration, can be of physical-chemical and microbiological nature. Among physical-chemical aspects, there should be enumerated the modifications in the vitamin content.

The losses of A provitamin are very low for the vegetables scalded beforehand, and a little bit higher for those unscalded. B vitamin complex

suffers minimum losses during the storage of the frozen products, and PP vitamin resists very well during the processing and storage procedure. Concerning C vitamin, the losses from the storage period at temperature of  $-18^{\circ}\text{C}$  are illustrated in the figure 1. The data percentage estimation of the above chart is drawn up in table no.1.

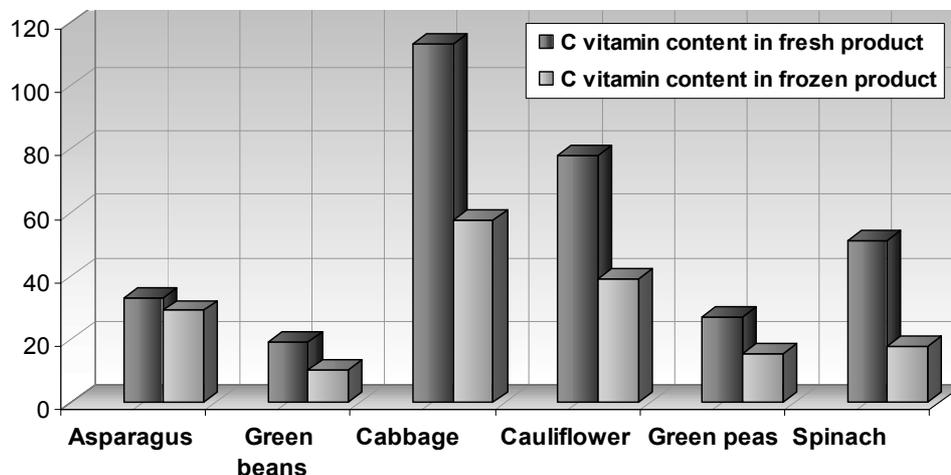


FIGURE 1. THE LOSSES OF C VITAMIN FROM SOME VEGETABLES DURING THE ENTIRE FROZEN PROCESS

Table 1. C vitamin losses after 6 months of storage at  $-18^{\circ}\text{C}$

Product	C vitamin losses, % medium and variations
Asparagus	12 (12-13)
Green beans	45 (30-68)
Cabbage	49 (35-68)
Cauliflower	50 (40-60)
Green peas	43 (32-67)
Spinach	65 (54-80)

Sterilization produces a series of modifications in the product: the enzymes are destroyed, as well thermo-labile vitamins, the proteins coagulate themselves, the soluble substances of the product are partially changing into liquid ones, there occur taste, flavor and structure modifications.

Vegetables are food products of vegetal nature for mass consumption, which plays an important role in nourishment due to its special sensorial features and precious nutritive elements: glucides, organic acids, vitamins, mineral salt, etc. A specific feature of the vegetables, consist in the fact that most of them can be used in nourishment in the fresh state as well, in the processed one.

The present work is carrying out a comparative study of the content in the main vitamins of some vegetables preserved by sterilization and freezing. The data are included in table no. 2 and represented by chart in figures 2 ...5.

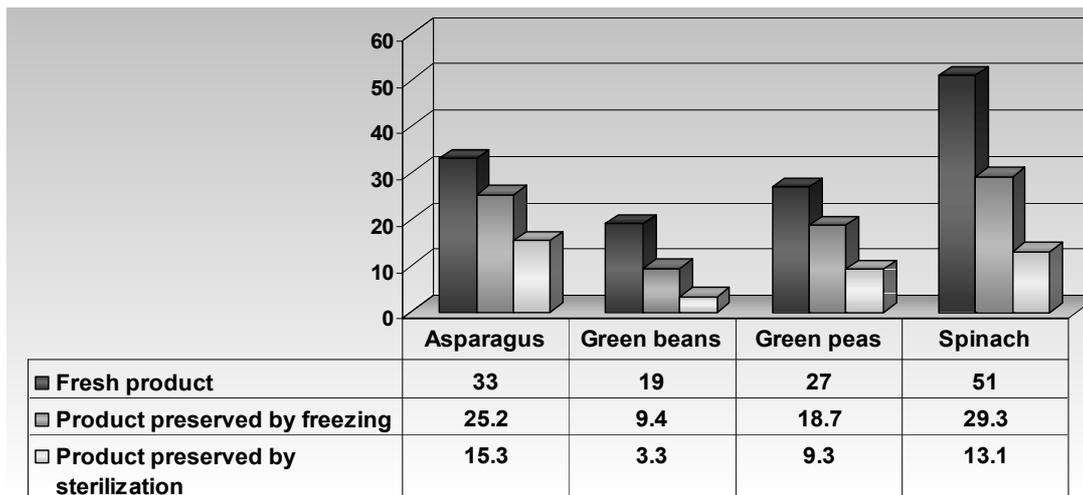


Figure 2. C vitamin losses of some preserved vegetables by freezing or sterilization

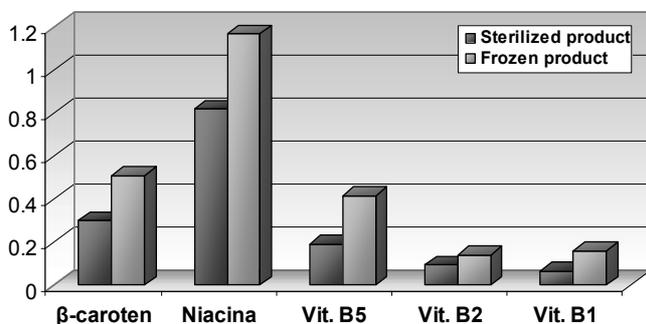


Figure 3. Vitamin deficit for asparagus preserved by freezing and sterilization

Figure 4. Vitamin deficit for green beans preserved by freezing and sterilization

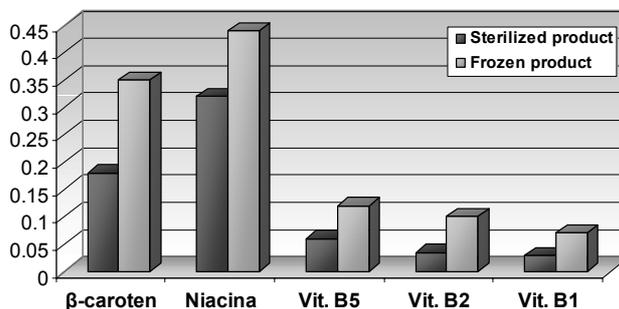


Figure 5. Vitamin deficit for green peas preserved by freezing and sterilization

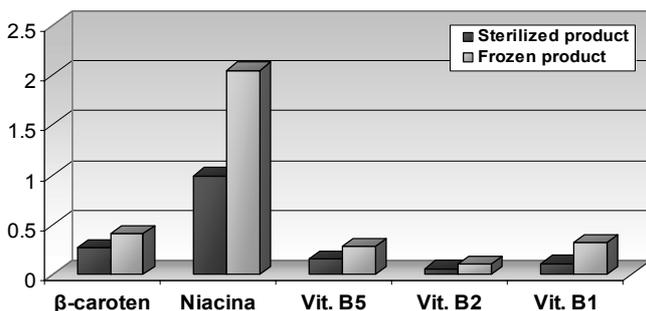
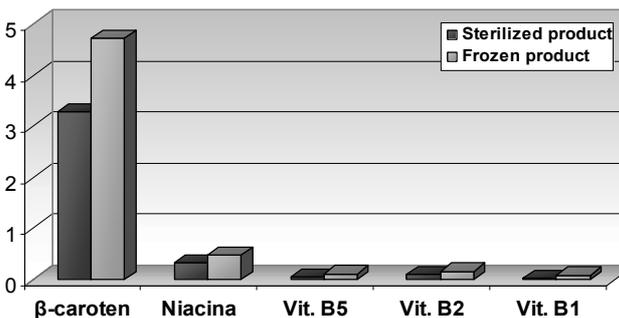


Figure 6. Vitamin deficit for spinach preserved by freezing and sterilization



From the data presentation and chart illustration it can be observed a reduction of the content in the main vitamins of the vegetables preserved by freezing and sterilization, given the fresh products and, at the same time, the diminution of the vitamin deficit for the products preserved by freezing given their sterilization preserving.

## CONCLUSIONS

1. For obtaining quality-frozen products it is necessary that all the links constituting the frigorific chain to fulfill the following conditions:
  - the "cold action" to occur as soon as possible after the harvest of raw materials;
  - the product freezing to be done in a very short period and it have to be continued until the temperature in the centre of the product reach  $-18^{\circ}\text{C}$ ;
  - the food product has to be stored at a low temperature during the entire frigorific process, from the producer to the consumer;
  - the food products to be stored to their specific, different temperatures.
2. Sterilization destroys all forms of existence of the micro-organisms providing a long-term storage of the products, but at the same time it produces physical, chemical and histological modifications in the product, it partially destroys the vitamins and modifies the properties of the proteins. The sterilization operation has to be optimized in such a way, that the qualities of the finished product not to be affected.
3. The comparative study of the vitamin content in some vegetables preserved by sterilization and freezing proves the diminution of the vitamin losses by using "the cold" as a preservation method.
4. Even in suitable work and storage conditions, the food products have a limited storage period.

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