ANALYSIS OF VITAMIN C CONTENT FROM SOME VEGETABLES FOOD PRODUCTS COMMONLY USED IN HUMAN FOOD

Bei Mariana Florica*, Domocoş Daniela**

*University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea, Romania, e-mail: domocosmariana@yahoo.com
**University of Oradea, Faculty of Medicine and Pharmacy, 10 Piața 1 Decembrie St., 410073 Oradea, Romania, e-mail: danadd76@yahoo.com

Abstract

The main argument of the analysis of the vitamin C content of vegetable foods commonly used in human nutrition is motivated by some characteristics of this vitamin, as follows:

The proportion of vitamin C in plants depends on the ascorbicoxidaza enzyme.

In the free-form ascorbic acid is very labile in the presence of air and an enzyme catalysts - ascorbiconoxidaza - a metalloenzymes containing Cu, oxidized ascorbic acid in dehydroascorbic acid or compounds with no vitamins activity such as dicetogluconic acid. Under the action of strong oxidants, vitamin C degradation occurs irreversibly moving in oxalic and threonucleic acids and thus losing the vitamin effect (Banu at all, 1993, Mihalache, 2003).

It represented the rich water-soluble vitamin, is highlighted especially in the external parts of the plant where the proportion of oxygen is higher.

Key words: vegetable food, C vitamin ,food importance of vegetables

INTRODUCTION

Rational diet recommends consumption of foods with vegetable and animal origin in the daily diet in order to provide balanced proportions, nutritional factors: carbohydrates, proteid, lipids, minerals, water and vitamins (Banu, 1997).

Vegetables are considered a basic factor of human health through the food values, therapeutic effects and culinary finesse of vegetables products, contribute to an increased interest of consumers in such foods (Apahidean, 2001, 2003).

Some vegetables with lower content of vitamin C have a significant contribution through their higher weight in the diet such as carrots, having a content of 6-10 mg / 100 g product, parsley leaf 140-146 mg / 100 g product and red pepper has a higher content amounting to more than 200 mg / 100 g product values that are provided in the fresh product (Indrea at all, 2009). The content of C vitamin in the same species varies widely, depending on the variety, natural and technical conditions for growing (Stănescu, 1996).

Synthesis of vitamin C is favored by light, so the organs well exposed and peripheral tissues, small and medium-sized specimens have a proportionally higher content of ascorbic acid.

Vitamin C losses during processing of vegetable food (fragmentation into small pieces, boiled in a large quantity of water, leaving them for a long time in the washing water).

MATERIAL AND METHOD

Material and methods applied in this study were aimed at initiating consumption of vegetables, fresh or after a preliminary processing resulting the increasing of taste quality through analyzing acid content of vitamin C, resulting the increasing of sapid and food digestibility, following the food effect, nutritional value of highly processed food on the human body.

These studied foods are the carrot, parsley and red pepper, food that can be eaten without heat treatment.

For the determination of vitamin C content was applied iodometric method because of its simplicity and speed and is used to make serial determinations at the same species of plant, when the data obtained give comparable values.

Iodometric method used as oxidant, iodine derived from the action of potassium iodated (KIO_3) on potassium iodide (KI).

RESULTS AND DISSCUSIONS

The results of content in vitamin C of red pepper, carrot and parsley leaves in terms of nutrition, are the main vegetables supplier of vitamin C for human body, because of high quantity in this vitamin and its sensitivity due to the heat treatment are considered information very useful and helpful in analyzing and ensuring contribution of vitamin C in a balanced diet preventing certain nutritional imbalances and depriving the body of main vitamins that rich in the body only through diet.

Interpretation of results was done by comparing the loose percentage from each product studied by two culinary processing methods as boiling and simmering cooking.

For establishing the content in vitamin C, in some vegetable products were taken every 4 samples of each product making an average sample and then were realized two analyzes.

Following analysis on the determination of vitamin C submitted on thermal processing resulted limited values, values which were noted in tables 1 and 2 and from these limits were calculated the average content of vitamin C in each product conform to figures 1 and 2, and the average results were compared with the control variant content, values obtained from food composition table, according to data provided by FAO.

Table 1

Content in vitamin C of some vegetables after the process of cooking by boiling processing

PRODUCT	VITAMIN C CONTENT control variant (mg/100g)	VITAMIN C CONTENT UNPROCESSED (mg/100g)		VITAMIN C CONTENT IN STATE OF BOILING PROCESSING (mg/100g)	
		Limit	Average	Limit	Average
Red pepper	212	198 - 207	202,5	134,64 – 140,76	137,7
Carrot	5	3 - 5	4	2,04 – 3,4	2,72
Parsley leaves	146	147 - 150	148,5	105,84 - 108	106,92

Table 1 show that the average level of vitamin C in unprocessed samples analyzed varies widely because of the rapid oxidation of vitamin that can occur during sample preparation. Following the determination of vitamin C content by boiling it is noticed big differences compared with unprocessed sample, differences are significant.

After the boiling process is observed losses of vitamin C about 35-37% in the case of red pepper, loss of 32% for carrots and loss of 28% in parsley leaves.

Figure 2 shows that losses of vitamin C after boiling of studied vegetables registered percentage values between 28% for the parsley leaves and 37% for red pepper.

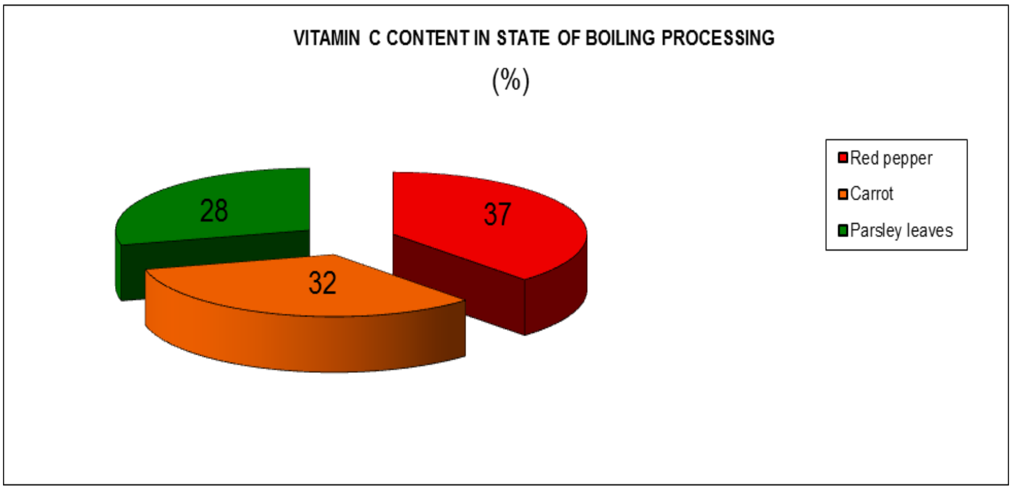

Fig. 1. Percentage loss of vitamin C in red pepper, carrot and parsley after boiling

Table 2

Vitamin C content of vegetables in the process of cooking by simmering processing

PRODUCT	VITAMIN C CONTENT Control variant	VITAMIN C CONTENT UNPROCESSED (mg/100g)		VITAMIN C CONTENT IN STATE OF BOILING PROCESSING (mg/100g)	
		LIMIT	AVERAGE	LIMIT	AVERAGE
Red pepper	212	198 - 207	202,5	182,16 – 190,44	186,3
Carrot	5	3 - 5	4	2,68 – 4,46	3,57
Parsley leaves	146	147 - 150	148,5	138,76 – 141,6	140,18

Table 2 shows that the average level of vitamin C in samples analyzed after thermal processing by simmering was reduced in comparison with boiling process about 4 times in the case of red pepper, 3 times lower for carrot and 5 times in the case of parsley leaves.

After the determinations concerning on loss of vitamin C by thermal processing - small differences were observed between the control sample and the samples analyzed, higher losses occurred in case of carrot with a percentage of 10,75%, followed by red pepper loss of 8% and parsley leaves with loss of 5,60%

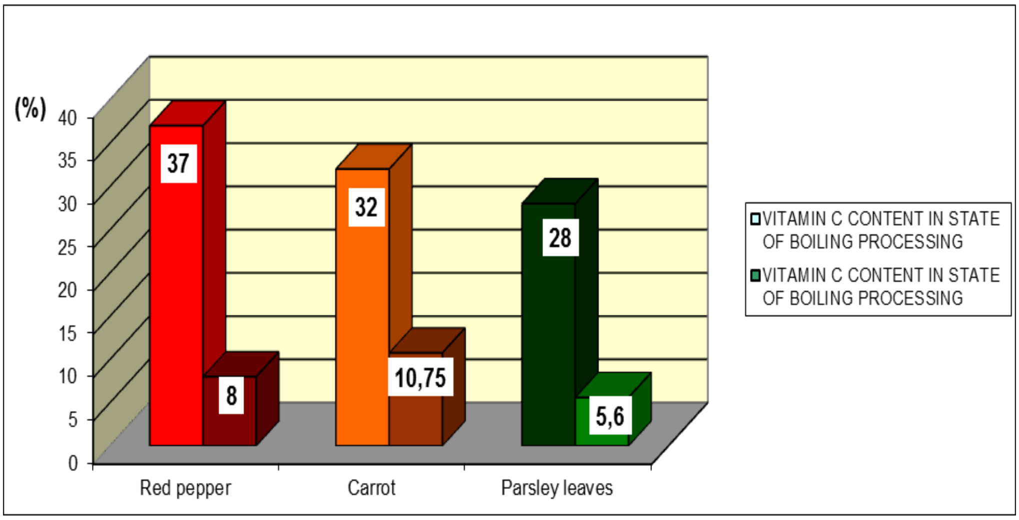

Fig. 2. Percentage of vitamin C loss in red pepper, carrot and parsley after boiling compared to processing by suppression

The process with thermic treatment through suppression causes loses of vitamin C in the studied products comparing to boiling process with a lower significance (Figure 2) with values between 5, 60% and 10, 75%.

These small losses attributing to the processing of vegetables concerning on nutrition a positive point and it is recommended as a processing operation of vegetables for human consumption.

CONCLUSIONS

Relatively recent research findings on nutrition domain showed great content in vitamins and minerals of these vegetables and the food diversity, their availability on market and consumption in fresh condition determined between specialists in food industry and safety food a review of conception of human food and preparation of food, through emphasizing analysis of nutritional character and by preventive factor for health.

Food processing procedures lead to significant losses of vitamins especially vitamin C, these losses had values between 35% - 70% obtained by boiling with some particularities.

Inactivation of ascorbicoxidaze or reduction of oxygen, during the processing of the blanching vegetables (scalding at a temperature of 95 -100 ° C) by boiling in closed vessels can reduce the loss of ascorbic acid.

Boiling vegetables in steam (under light pressure) to over 100 ° C, the loss of ascorbic acid are relatively low, because on the one hand the main factor ascorbinolitic (oxygen) is off and on the other hand, shortens the time of exposure to the action of heat, but when the temperature exceeds 110-120 ° C destroying of vitamin C is more important as the heat treatment is more intense.

After analyzing the influence of boiling process on the content of vitamin C was observed that these vitamin losses were about 35-37% for red pepper, loss of 32% for carrots, and losses of 28% for parsley leaves.

Influence of heat treatment process by simmering regarding to the vitamin C content in samples analyzed after thermal processing by simmering was reduced in comparison with boiling process about 4 times in the case of red pepper, 3 times lower for carrot and 5 times in the case of parsley leaves, percentage losses were 10,75% for carrot, red pepper loss was 8% and parsley leaves with loss of 5,60%.

ACKNOWLEDGEMENT

This paper has been financially supported within the project entitled ***"Horizon 2020 - Doctoral and Postdoctoral Studies: Promoting the National Interest through Excellence, Competitiveness and Responsibility in the Field of Romanian Fundamental and Applied Scientific Research",*** contract number POSDRU/159/1.5/S/140106. This project is co-financed by European Social Fund through Sectoral Operational Programme for Human Resources Development 2007-2013. **Investing in people!**

REFERENCES

1. Apahidean,Al.S. et. al, 2000, Legumicultură generală, vol. I, Ed. Risoprint, Cluj-Napoca.
2. Apahidean,Al.S. et. al, 2000, Legumicultură generală, vol. II, Ed. Risoprint, Cluj-Napoca.
3. Apahidean,Al.S. et. al, 2001, Legumicultură generală, Ed. AcademicPres, Cluj-Napoca.
4. Apahidean Al.S., 2003, Cultura Legumelor, Ed. AcademicPres, Cluj-Napoca.
5. Indrea D., S.Al., Apahidean, Maria Apahidean, D.N., Măniutiu, Rodica Sima, 2009, Cultura legumelor, Ed. Ceres, Bucuresti.
6. Banu O, Bordei Despina, Costin Gh., Segal B., 1974, Influenţa proceselor tehnologice asupra calităţii produselor alimentare, vol. I, Editura Tehnică, Bucureşti.
7. Banu C. et. al., 1997, Probleme ale calităţii produselor alimentare, Universitatea Galaţi.
8. Banu C. et. al, 1993, Progrese tehnice, tehnologice şi ştiinţifice in industria alimentară, vol. II, Editura Tehnică, Bucureşti.
9. Dumitrescu Horea, Milu Constantin, 1997, Controlul fizico-chimic al alimentelor. Ed. Medicală, Bucureşti,
10. Marca, Gh., 2000, Tenologia produselor legumicole, Ed. Risoprint, Cluj-Napoca.
11. Măniutiu D., 2006, Produse legumicole, Ed. AcademicPres, Cluj-Napoca.
12. Mincu I., 1993, Impactul om-alimentație, Ed. Medicala, 110-111
13. Mihalache M., 2003, Consumul de legume proaspete, o necesitate pentru sănătatea omului, Revista Hortinform nr.10-134, Bucureşti.
14. Popescu M., Vasilescu E., Gudi M. 1970 – Sortimentul şi tehnologia produselor culinare în alimentaţia publică, Ed. Didactică, Bucureşti.
15. Soare, Rodica, Duţă Adriana, 2008, Tehnologii legumicole alternative, Ed. Universitaria, Craiova.
16. Stănescu, D., 1996, Interferenţe nutriţionale şi tehnologice, Editura Oscar Print, Bucureşti.