The content of the vitamin C and β-carotene in nettle and ramsons and its modification at culinary treatment and drying

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Abstract
Adequate daily intake of food sources of vitamin C and β-carotene has a central role in ensuring a good health due to their antioxidative and protective properties. Early springtime plants nettle and ramsons are valuable sources of vitamins C and β-carotene in nutrition after the relative winter shortage in fresh food suppliers of these vitamins. Nettle and ramsons are traditionally used in Moldova in nutrition in springtime in various dishes. The aim of the present work was to study the content of vitamin C and β-carotene in nettle and ramsons and their modification at culinary treatment and drying for evaluating the level of considered vitamins' preservation in processed foods.

Keywords: Vitamin C, β-carotene, springtime plants, nettle, ramsons

Rezumat
Consumul zilnic adecvat de surse alimentare de vitamina C şi β-caroten are un rol central în asigurarea unei bune stări de sănătate datorită proprietăților lor antioxidante şi de protecție. Plantele de primăvară timpurie, urzicile şi leurda, sunt o sursă valoroasă de vitamina C şi β-caroten în alimentație după penuria relativă în surse proaspete ale acestor vitamine în timpul iernii. Urzicile şi leurda sunt utilizate tradițional în Moldova primăvara în alimentație în diverse bucate. Scopul lucrării prezente a fost cercetarea conținutului de vitamina C şi β-caroten în urzici şi leurdă şi a modificarii lor la tratarea culinară şi la uscare pentru evaluarea nivelului de păstrare a vitaminelor considerate în alimentele preparate.

Cuvinte cheie: Vitamina C, β-caroten, plante de primăvară, urzici, leurdă

1. Introduction

Knowledge on vitamins presence in foods is important both for an appropriate choice of products according to the physiological needs and foods availability and for applying appropriate technological treatments that permits to maximally preserve the vitamins in the cooked foods.

A particular interest presents the sufficient daily intake of food sources of vitamin C and β-carotene that have a central role in ensuring a good health due to their antioxidative and protective properties (Krinsky, 2001; Martin, 2003). Major deficiencies in these vitamins occur in spring period when their content in foods after the winter is diminished.

Dietary supplements containing these vitamins are popular, but in light of some evidences the vitamins consumed as supplements may not provide the same health benefits as consuming these same vitamins from foods. Taking into account the diminished availability of fresh fruits and vegetables in spring there is sense to look for the alternative sources of vitamins that may be the seasonal plants.

Early springtime plants nettle and ramsons are traditionally used in Moldova in nutrition in various dishes. The leaves and stems of nettle and ramsons are consumed in salads, soups, garnishes, gravies, main courses and as staffing for tarts, pies, patties.

Nettle and ramsons are available and valuable sources of vitamins C and β-carotene in nutrition after the relative winter shortage in fresh food suppliers of these vitamins. The aim of the present work was to study the contents of vitamin C and β-carotene in nettle and ramsons and their

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modification at culinary treatment and drying for the evaluation of the level of considered vitamins' preservation in processed foods.

2. Materials and methods

2.1. Materials

Fresh springplants nettle and ramsons were collected in the Center region of the Republic of Moldova. Dried samples of plants were prepared in the TUM laboratory. Were applied two methods: convection and combined convection with microwave treatment at 90 W.

2.2 Methods

Vitamin C was determined by photocolorimetric method. Ascorbic acid was extracted from studied samples and treated with 2,6-dichlorphenol-indophenol that reacts selectively with ascorbic acid.

ß- caroten was extracted from the studied samples with hexane, purified by absorption chromatography and further determined by photocolorimetric method at 540 nm.

Plants were treated by (a) boiling, (b) boiling with subsequent infusion and dried.

3. Results and discussion

In the present work it were evaluated the vitamins C and ß- carotene content in the fresh nettle and ramsons, in plants and decoction after boiling and infusion for different timespan and in plants dried by convection and a combined method – convection and microwaves at various regimes.

The modification of studied vitamins concentration in processed plants is presented in the figures 1–5.

The modification of the vitamin C content in nettle and ramsons when boiling up to 15 minutes, the often applied culinary method is presented in figure 1. The data show that both plants are important sources of vitamin C, the initial content in vitamin C in fresh nettle and ramsons being very close: 56 and 55 mg%, respectively. During 15 minutes boiling the content of vitamin C is decreasing by 34% in nettle and 31% in ramsons, the major part of the vitamin lost by plants remaining in the decoction.

The remaining amount of the vitamin C in boiled plants is still high – about 38 mg%. The data in the figure 2 show that during the infusion of 2 minutes boiled plants the content of vitamin C is continuing to decrease in a greater extent in the nettle that in ramsons.

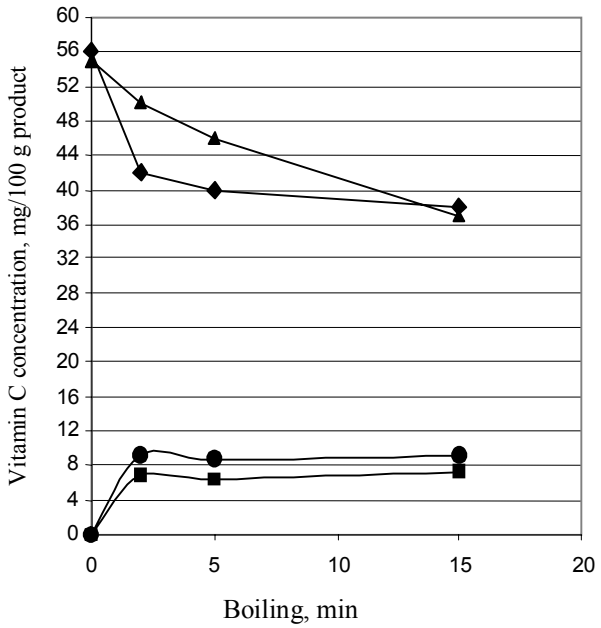

Figure 1. Modification of vitamin C concentration in nettle and ramsons when boiling

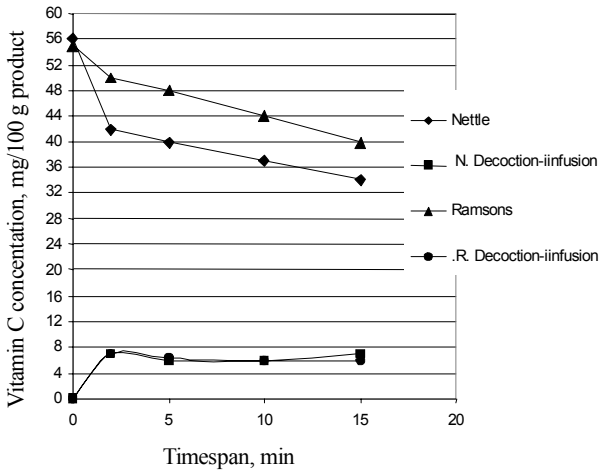

Figure 2. Modification of vitamin C concentration in nettle and ramsons when infusing after 2 minutes of boiling

This could be explained by a different chemical composition of these two plants, particularly counts the content of copper and iron, metals with catalitic effect on vitamin C degradation and also the phenols

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content that protect against ascorbic acid destruction (Larson, 1988; Owen, 1999).

The data in fig 3 show the modification in the ß-carotene content in nettle and ramsons after 2 minutes boiling followed by various timespan infusion. Data show that during 2 minutes of heat treatment the content of ß-carotene in both plants is increasing, in ramsons - 10 times (from 0.4 to 4.0 mg/100 g of product) and in nettle – about 13 times (from 0.5 to 6.5 mg/100 g of product) in comparison with respective levels in the raw plants.

The increase in ß-carotene content during heat treatment perhaps is due to the transition of other carotenoids in ß-carotene. Further infusion over 15 minutes is accompanied with a slight decrease and stabilization of the ß-carotene content in ramsons at about 3.5 mg/100 g of product. The infusion of nettle after the heat treatment conducted to a decrease of ß-carotene content from 6.5 to 3.8 mg/100 of product.

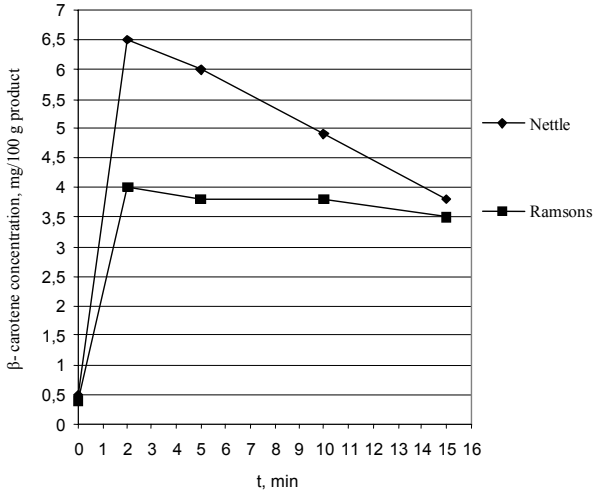

Figure 3. Modification of ß- carotene concentration during 2 minutes boiling followed by infusion

Being a good source of vitamin C and ß- caroten there is sense to dry the nettle and ramsons thus extending their utilization beyond the springtime period, particularly in winter. Presented in figures 4 and 5 data on the content of vitamin C and ß- carotene in studied plants dried by convection at 65 and 75°C and with combined convection and microwaves at 90 W show a good preservation of vitamins. The more convenient method and regime for preserving the two vitamins is convection.

The temperature recommended to apply will be different for drying nettle 75°C and for drying ramsons
65°C.

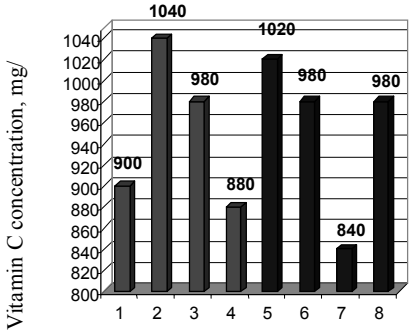

Figure 4. Concentration of vitamin C in dried nettle and ramsons: 1 – Nettle, convection at 65°C; 2 – Nettle, convection at 75°C; 3 – Ramsons, covection at 65°C; 4 – Ramsons, convection at 75°C, 5 – Nettle, combined method at 65°C; 6 – Nettle combined method at 75°C; 7 – Ramsons, combined method at 65°C; 8 – Ramsons, combined method at 75°C

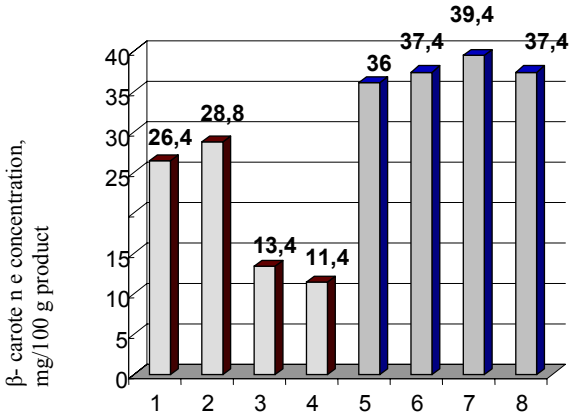

Figure 5. Concentration of ß-carotene in dried nettle and ramsons: 1 – Nettle, convection at 65°C; 2 – Nettle, convection at 75°C; 3 – Ramsons, covection at 65°C; 4 – Ramsons, convection at 75°C; 5 – Nettle, combined method at 65°C; 6 – Nettle, combined method at 75°C; 7 – Ramsons, combined method at 65°C; 8 – Ramsons, combined method at 75°C.

4. Conclusions

The present study show that springtine plants nettle and ramsons are important alternative to fruits and vegetables sources of vitamin C and ß-carotene even after their cooking.

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The considered vitamins keep high level in dried plants, the convection method being the recommended one with temperature regime of 65°C for nettle and 75°C for ramsons.

It is worth developing new recipes of dishes on the basis of the nettle and ramsons as an alternative source to fruits and vegetables of vitamin C and ß- carotene.

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