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Characterization of a food supplement

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Abstract

Evaluation of structural and functional changes associated with everyday's stress has generated the appearance of *food-drug* (***nutraceuticals/foods supplements***), with target functions, to compensate for the *prophylaxis/therapy of synthetic drugs*. The present study brings within discussion obtaining under *rustic* conditions, of the *fir tree syrup* from *Obcinele Bucovinei*, as a *food supplement* (considered *nutraceuticals*), administered in the case of respiratory diseases. Following the study of literature, supported by field studies, we developed a flow chart diagram of operations, including the *fortification* (by the *incorporation of some spices*), of *fir-tree syrup*. The determination of some quality indicators (vitamin C, Brix°, water, polyphenols), on the resulting products, highlights the increasing antioxidant and antimicrobial activity with increased health benefits.

Keywords: nutraceuticals, foods supplements, fir tree syrup, spices, quality indicators, health benefits

1. Introduction

Nutritional issues and the lifestyle with direct effects on immunity are partly explained by the **Barker** hypothesis, the *phenotype-prosperity hypothesis*, which shows that "*nutritional transition starts from intrauterine life as a response to inappropriate maternal diets with adaptive immune modifications, and of fetal organs* ", and the changes are irreversible, generating a diverse pathology (cardiopathy, hypertension, insulin resistance, diabetes, bronchial asthma, obesity, osteoporosis, some types of cancer) [1]. This has forced the reorientation of the diagnosis and treatment with the imposition of *food-drug* use with *target functions* to compensate for *the prophylaxis/therapy of synthetic drugs*. The European Commission of Functional Foods in Europe appreciates that a food can be defined as "*functional*" if the activation of one or more "target" functions in the body, in addition to known nutritional effects, is demonstrated. Consumed, they must demonstrate the curative effects in amounts normally consumed in the diet [3, 4].

The term "*functional food*" was first used in Japan in the mid-1980s, defining processed foods containing ingredients with a specific role in the physiology of the body, in addition to the passive nutritional role or "*health-specific foods*"(FOSHU) [5, 6]. According to Directive 2002/46 / EC of the European Parliament and of the European Council, "*food supplements*" means foods intended to supplement the diet and which are concentrated sources of nutrients or other substances with a nutritional or physiological effect, alone or in combination, marketed in dosage form or in presentation forms such as capsules, pills, tablets, pills or the like, powder cachets, liquid vials, dropper vials and other similar liquid forms and powders to be taken in small "unitary quantities" [7]. Functional food constituents present in food supplements and/or nutraceuticals are standardized and characterized by fractions or extracts containing protective agents of different purity, incorporated into various edible preparations, cosmetics, and pharmaceuticals [8].

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The active role of natural compounds in prophylaxis and alternative (natural) therapy is one of the areas of interest and research in the field of nutritional science and food. The information tries to change perceptions and opinions on the effects of natural compounds and on reviewing food education practices.

The *functional food* industry (food and/or nutraceutical supplements) is a dynamic, ascending, accelerated development. It is estimated that the sector assigned to them will increase by 6.9%, of the food supplements by 3.8%, growth sustained both by technological development and innovation and by the coverage of a range of health problems [9, 10].

Regarding the place occupied by food / functional supplements on the market, they are covered by conventional foods, diets, pharmaceuticals and medicines (Figure 1).

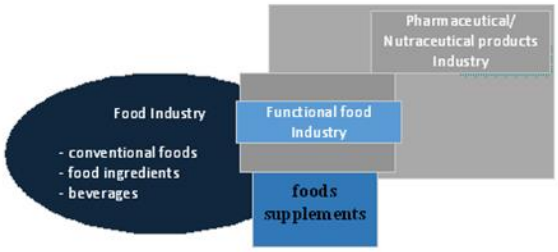


Figure 1. The layout of the food supplements industry relative to other emerging industries [11].

2. Materials and methods

a) materials: syrup made from fir buds crafted in the Obcinelor Bucovina area, later fortified (figure 2).

b) methods: determination of active ascorbic acid with 2,6- diclorfenolindofenol; quantities of sugar (Degrees Brix); waters (drying method in the oven); antioxidant activity (polyphenols); antimicrobial activities.

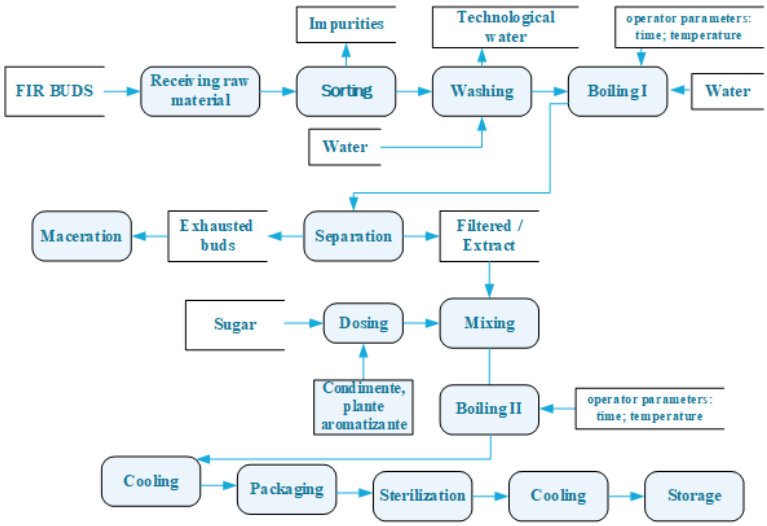


Figure 2. Block diagram of the proposed operation for obtaining fortified fir syrup and derived.

3.Results and discussions

The proportion of ascorbic acid (Table 1, Figure 3) shows a high fortification in sample 4 (329.44 mg / L) versus samples **1** and **2**. Contrary to expectations, sample **3** does not bring a maximum cumulative contribution to the three spices (cinnamon, pepper, and cloves). This is probably due to the interactions between the various elements in the product matrix.

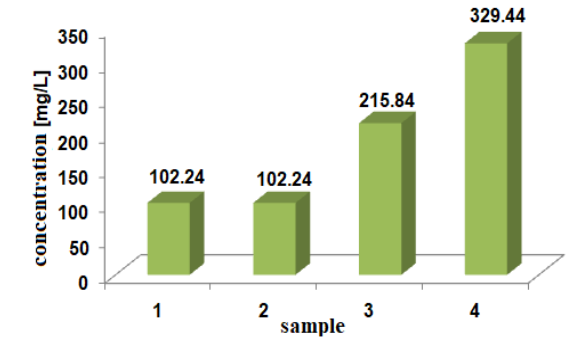
The slope of the graph confirms the correctness within the limits imposed by the fortifying input of the embedded materials.

The values of the linear correlation coefficient R, close to the unit, parabolically interpreted (for all the quality indicators studied), authenticate the concentration dependence on the analyzed sample.

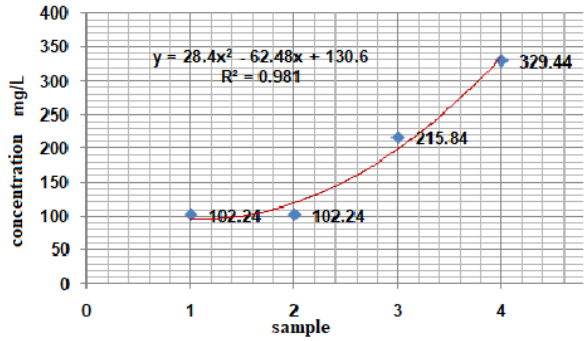
Table 1. The ascorbic acid ratio in the analysed samples

Nr. crt.	Source (the syrup from the fir tree)	Proportion [mg/L]
1	simple	102,24
2	+cinnamon	102,24
3	mix*	215,84
4	+chili pepper	329,44

*mix - pepper, cinnamon, and cloves.

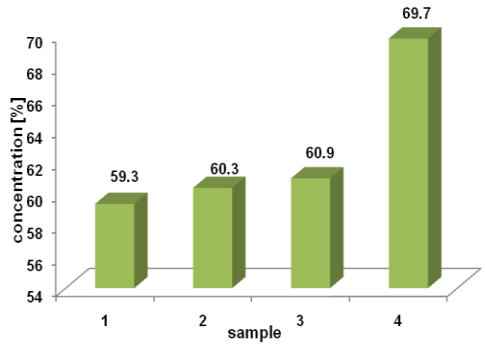


(a)



(b)

Figure 3. Evolution of ascorbic acid in analysed samples: a) Graphical interpretation; b) Mathematical-graphic interpretation.



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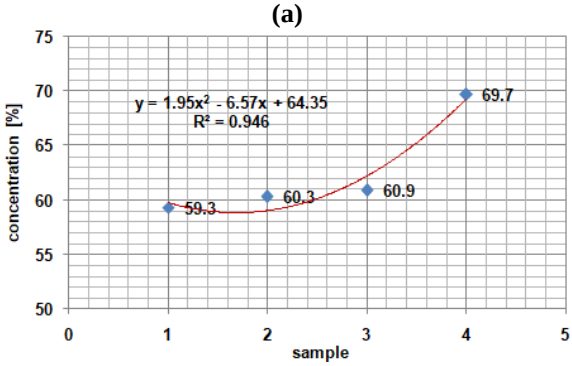

(b)

Figure 4. Evolution of Brix degrees in the analysed samples: a) Graphical interpretation; b) Mathematical-graphic interpretation

Brix degrees (Table 2, Figure 4) show that sample **4** (chili) represents the maximum (69.7%), conditioned by the operating parameters in boiling step II (Figure 1, Prolonged boiling time with the removal of more water (concentration) and increased viscosity)). Samples **1**, **2** and **3** are somewhat respectable in proportion, and can also be a parameter for controlling the boiling/conditioning quality of the finished product.

Table 2. The ratio of Brix degrees in the analysed samples

Nr. crt.	Source (the syrup from the fir tree)	Proportion [%]
1	mix*	59,3
2	+cinnamon	60,3
3	simple	60,9
4	+chili pepper	69,7

*mix - pepper, cinnamon, and cloves.

The evolution of **water** (Table 3, Figure 5) confirms the influence of time on the boiling process excited by the sample with the addition of chili (**22.34%**). A maximum (**43.08%**) shows the simple syrup (result after the first boiling step), support for later fortification (Figure 2). Samples **2** and **3** appear as intermediates (**34.93%** and **41.16%** respectively), probably cumulated with the weight of water in the material.

Table 3. Evolution of water ratio in the analysed samples

Nr. crt.	Source (the syrup from the fir tree)	Proportion [%]
1	chili pepper	22,34
2	cinnamon	34,93
3	mix*	41,16
4	simple	43,08

*mix - pepper, cinnamon, and cloves.

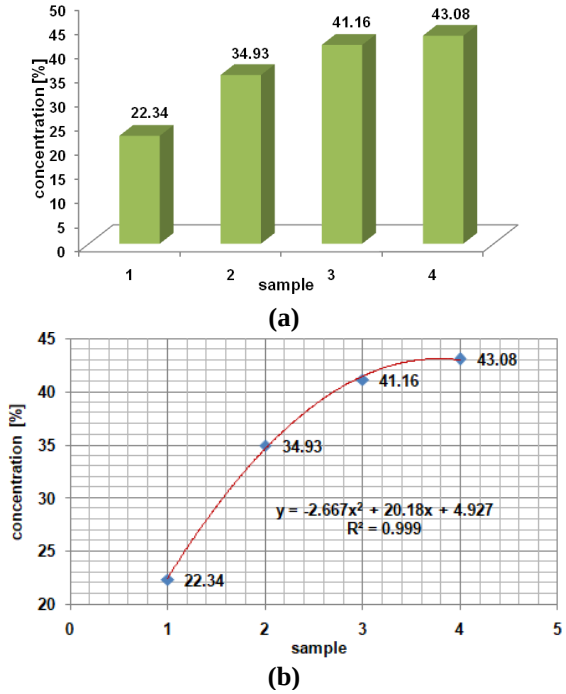

Figure 5. Evolution of water in analysed samples: a) Graphical interpretation; b) Mathematical-graphic interpretation.

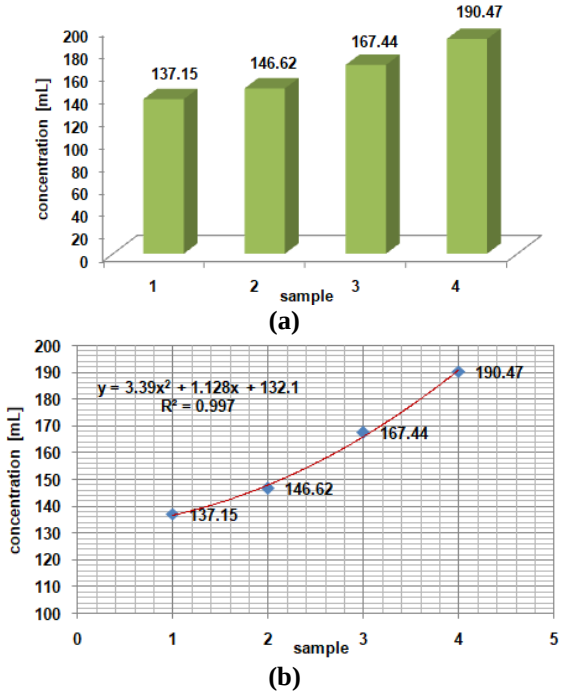

Figure 6. Evolution of polyphenols in analysed samples: a) Graphical interpretation; b) Mathematical-graphic interpretation.

Polyphenols (Table 4, Figure 6), responsible for the antioxidant activity, potentiate the protective effects by specific, bioactive, target (anti-inflammatory, antimutagenic) function.

The profile of the technological process (the boiling point I and II, Figure 2) for the fir tree syrup, subsequently fortified, quantifies a maximum (190.47 mL) for sample 4.

The reduced antioxidant activity of sample 1 (+ chili) for which the vitamin C content is maximal (329.44 mg / L), compared to sample 2 (single syrup, 146.62 mL) should be noticed.

Table 4. The evolution of the polyphenols ratio in the analysed samples

Nr. crt.	*Source* (the syrup from the fir tree)	Proportion [mL]
1	+chili pepper	137,15
2	simple	146,62
3	+cinnamon	167,44
4	mix*	190,47

*mix - pepper, cinnamon, and cloves.

The results obtained for **antimicrobial activity** (Table 5), shows that in the case of the **NTG** only product with the addition of a mix, shows the development of colonies. Probably the previous infestation from the manufacturing process and/or during handling. This mold (Table 6) is minimal, determined by the antimicrobial activity of each spice taken in the study.

Table 5. NTG.

Sample (syrup from the fir tree:)	Reading 1	Reading 2
Simple	-	-
+ chili pepper	-	-
+ cinnamon	-	-
mix*	22 colonies	21 colonies

*mix- pepper, cinnamon, and cloves.

Table 6. Fungy

Sample (syrup from the fir tree:)	Sample 1	Sample 2	Bacteria
Simple	1 colony	1 colony	*Aspergillus*
+ chili pepper	2 colonies	1 colony	*Aspergillus*
+ cinnamon	-	-	-
mix*	1 colony	1 colony	*Yeasts*

*mix- pepper, cinnamon, and cloves.

The results for the **antimicrobial activity** (Table 5) show that in the case of NTG only the product with the addition of the mixture presents colonization, probably due to previous contamination in the manufacturing process and/or during handling. The presence of fungi (Table 6) is minimal, determined by the antimicrobial activity of each spice taken in the study.

4. Conclusion

The study warns the public about issues related to the concept of a nutraceutical product and a dietary supplement, highlighting the "precarious" limit between the two classes of products, as well as the restrictions imposed on a diversified diet to prevent the onset of hypervitaminosis. A block diagram of operations has been developed with a successive scrutiny of two boiling operations. Finished products were quantified based on quality indicators (vitamin C, Brix degrees, water, polyphenols), which highlight the increase in antioxidant and antimicrobial activity with increased health benefits.

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Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human / or animal subjects (if exist) respect the specific regulation and standards.

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