New nutritional data on selected traditional foods from Black Sea area countries

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Outline

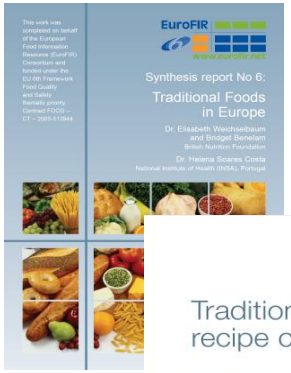
- BaSeFood Project
- Traditional foods
- Prioritisation of components
- Selection of laboratories
- Nutritional composition
- Dissemination
- Output and benefits

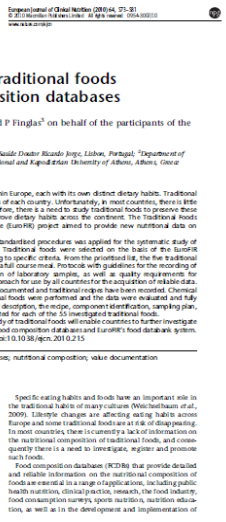
EuroFIR
European Food Information Resource

EuroFIR Network of Excellence

Coordinator – Paul Finglas

A story of success....





ORIGINAL ARTICLE

New nutritional data on traditional foods for European food composition databases

HS Costa[1], E Vasilopoulou[2], A Trichopoulou[2] and P Finglas[3] on behalf of the participants of the EuroFIR Traditional Foods Work Package

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Background/Objectives: There are many different cultures within Europe, each with its own distinct dietary habits. Traditional foods are the key elements that differentiate the dietary patterns of each country. Unfortunately, in most countries, there is little information on the nutritional composition of such foods. Therefore, there is a need to study traditional foods to preserve these elements of European culture and, if possible, enrich and improve dietary habits across the continent. The Traditional Foods work package within the European Food Information Resource (EuroFIR) project aimed to provide new nutritional data on traditional foods for use in national food composition tables.

Subjects/Methods: A EuroFIR consensus-based method with standardised procedures was applied for the systematic study of traditional foods and recipes in selected European countries. Traditional foods were selected on the basis of the EuroFIR definition of the term 'traditional food' and prioritised according to specific criteria. From the prioritised list, the five traditional foods per country to be investigated were selected to represent a full course meal. Protocols with guidelines for the recording of traditional recipes, the collection, preparation and distribution of laboratory samples, as well as quality requirements for laboratory selection, were developed to establish a common approach for use by all countries for the acquisition of reliable data.

Results: The traditional character of the selected foods has been documented and traditional recipes have been recorded. Chemical analyses to determine the nutritional composition of 55 traditional foods were performed and the data were evaluated and fully documented according to EuroFIR standards. Information on food description, the recipe, component identification, sampling plan, sample handling, analytical method and performance was collected for each of the 55 investigated traditional foods.

Conclusions: This common methodology for the systematic study of traditional foods will enable countries to further investigate their traditional foods and to continue to update their national food composition databases and EuroFIR's food databank system.

European Journal of Clinical Nutrition (2010) 64, S73–S81; doi:10.1038/ejcn.2010.215

Keywords: EuroFIR; traditional foods; food composition databases; nutritional composition; value documentation

Introduction

Traditional foods constitute an important part of the culture, history, identity, heritage and local economy of a region or country and are keyelements for the dietary patterns of each country. These foods are commonly perceived as foods that have been consumed locally or regionally for a long time and the methods of preparation of such foods have been passed from generation to generation (Trichopoulou *et al.*, 2007).

Specific eating habits and foods have an important role in the traditional habits of many cultures (Weichselbaum *et al.*, 2009). Lifestyle changes are affecting eating habits across Europe and some traditional foods are at risk of disappearing. In most countries, there is currently a lack of information on the nutritional composition of traditional foods, and consequently there is a need to investigate, register and promote such foods.

Food composition databases (FCDBs) that provide detailed and reliable information on the nutritional composition of foods are essential in a range of applications, including public health nutrition, clinical practice, research, the food industry, food consumption surveys, sports nutrition, nutrition education, as well as in the development and implementation of

WP2.3.1 - Traditional Foods

Overall Objective: To provide new data on the nutritional composition of traditional foods in Europe for inclusion in national food composition tables with representative raw ingredients and recipes

BaSeFood Project

Sustainable exploitation of bioactive components from the Black Sea Area traditional foods (FP7-KBBE-227118)
Coordinator - L. Filippo D'Antuono

Traditional Foods

- Expression of culture, history and lifestyle
- Key elements that differentiate dietary patterns of each country
- Development and economic sustainability of rural areas
- Preservation of biodiversity

Is a food of a specific feature or features, which distinguish it clearly from other similar products of the same category in terms of the use of "traditional ingredients" (raw materials or primary foods) or "traditional composition" or "traditional type of production and / or processing method".

Trichopoulou, A. et al. (2007). Trends in Food Science & Technology, 18, 420-427.

BaSeFood Project 2009-2012

To **identify** and **characterise bioactive compounds in traditional food products** that can be **beneficial for human health** and are typical for the diet of EU neighbouring regions.

EXPECTED IMPACT

To increase knowledge of nutrients, food components and/or bioactive compounds effects on human health, **substantiating health and nutritional claims**.

Enhance the cooperation between scientific disciplines and stakeholders **(nutrition, practitioners, local food companies, etc.).**

Assist EU food industry to increase its innovation potential and competitiveness, in particular regarding **traditional foods** and SMEs.

Work Packages

WP1

Surveying, recording and describing traditional foods

WP4

Technological-chain effects on bioactives in traditional foods

WP2

Bioactive components, nutritional and microbiological characterization of traditional foods

SEVENTH FRAMEWORK PROGRAMME

WP 5

Chain development and consumer issues in health-promoting traditional foods

WP3

Health-promoting properties, absorption and bioactivity of target components

WP7

Management

WP6

Dissemination

Black Sea Area Countries (BSAC)

Bulgaria | Georgia | Romania | Russian Federation | Turkey | Ukraine

WP1 - Prioritisation of Traditional Foods


Cereal or cereal based foods


Herbs, spices and aromatic plants


Fruit or fruit based foods


Low or non-alcoholic fermented products


Vegetable or vegetable based foods

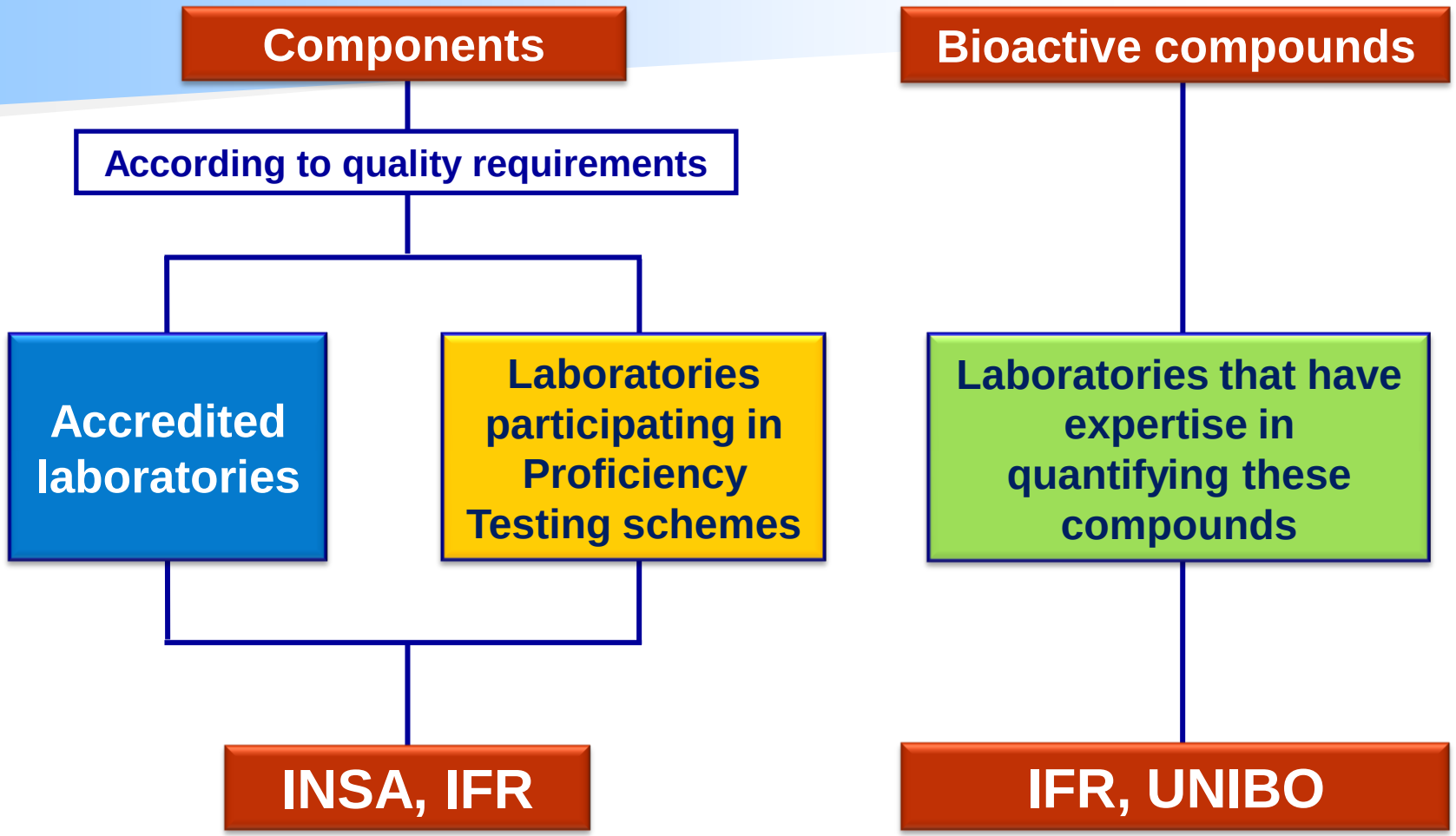

Oilseeds or oilseed products

Prioritisation of components and bioactive compounds

- Inclusion relevant data in national food composition databases
- Most relevant components to be analysed for each food
- Their importance in relation to the increased risk of diet-related chronic diseases

Proximates	**Moisture, ash, total nitrogen (for protein), total fat (individual fatty acids, cholesterol), dietary fibre, total sugars and starch**
Vitamins	**Vitamin A (all-*trans*-retinol), vitamin C, vitamin E (α-tocopherol) and vitamin B_2 (riboflavin), total folate**
Minerals & trace elements	**Sodium, iron, zinc and selenium**
Bioactive compounds	**Phenolics, glucosinolates and carotenoids**

Selection of laboratories



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BaSeFood







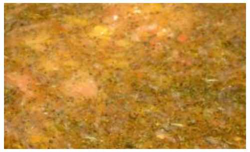









Nutritional composition of 33 Traditional Foods











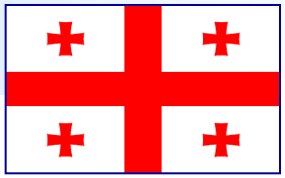



Instituto Nacional de Saúde Doutor Ricardo Jorge

SEVENTH FRAMEWORK PROGRAMME

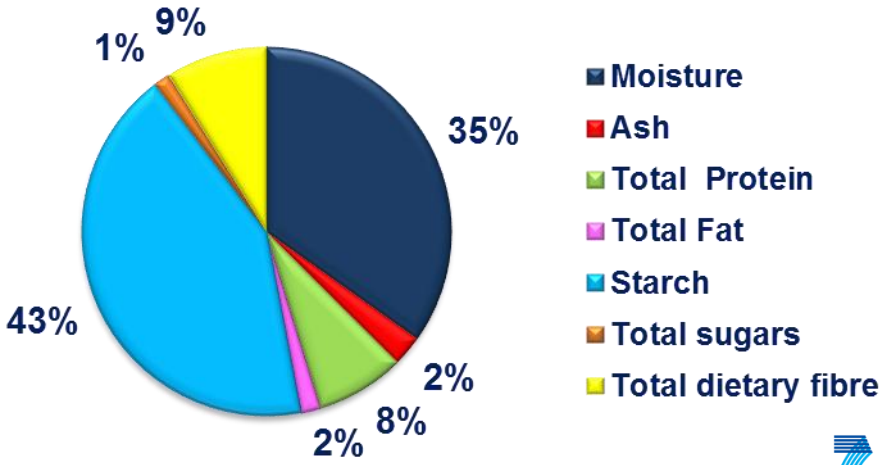
Cereal or cereal based foods

Traditional Food (English name)	Traditional Food (National language)
Baked layers of pastry stuffed with pumpkin	*Tikvenik*
Tsiteli Doli Bread	*Makhobeliani dolis puri*
Cornmeal mush	*Mămăligă*
Buckwheat porridge crumby	*Каша гречневая рассыпчатая*
Bulgur pilaf	*Bulgur pilavı*
Sour rye bread	*Хліб житній*



Tsiteli doli bread

A light blue tinged bread of oblong or oval shape, containing a small amount of floured makhobeli

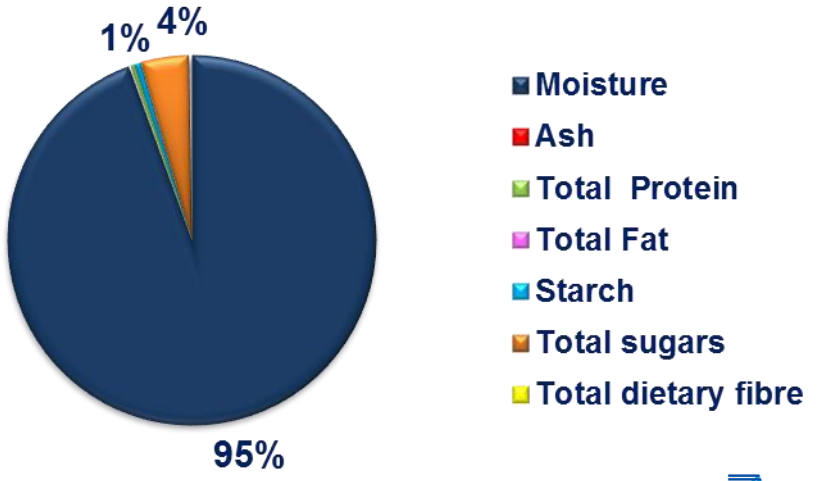


Vegetable or vegetable based foods

Traditional Food (English name)	Traditional Food (National language)
Rodopian dried beans	*Rodopski fasul*
Nettles with walnut sauce	*Chinchris mkhali nigvzit*
Nettle sour soup	*Ciorbă de urzici*
Vegetable okroshka	*Овощная окрошка*
Kale soup	*kara lahana corbasi*
Transcarpathian green borsch	*Zelenyj borshch Zakarpats'kyj*
Ukrainian borsch	*Борщ український пісний*

Vegetable okroshka

A cold soup with shredded vegetables and bread kvass.

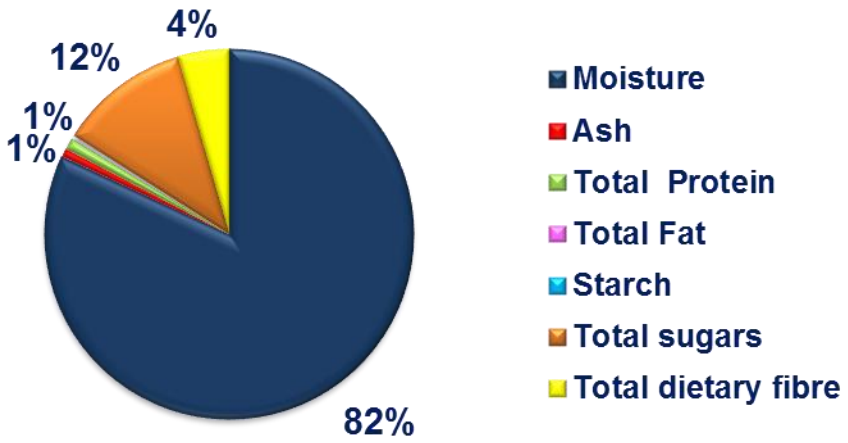


Fruit or fruit based foods

Traditional Food (English name)	Traditional Food (National language)
Rose jam	*Dko ot rozi*
Churchkhela	*Churchkhela*
Plums jam	*Magiun de prune*
Watermelon juice	*Арбузный сок*
Fruit of the evergreen cherry laurel	Karayemiş
Uzvar	*Узвар*

Fruit of evergreen cherry laurel

Fruit of evergreen cherry laurel *Prunus laurocerasus* L.

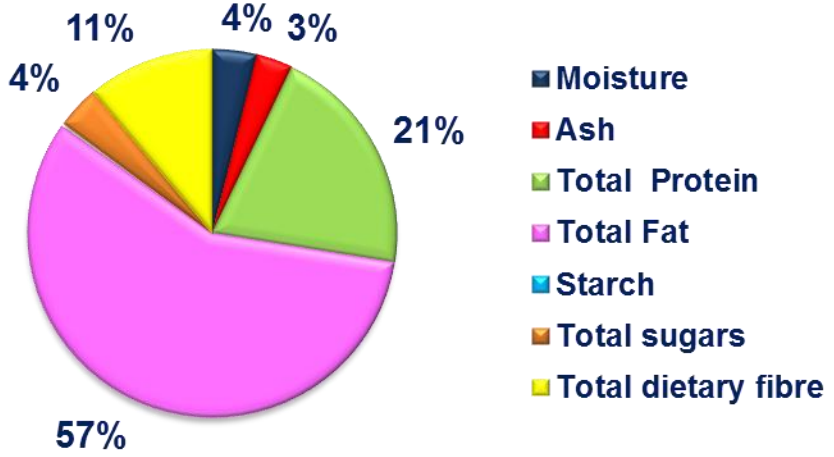


Oilseeds or oilseed products

Traditional Food (English name)	Traditional Food (National language)
Halva	*Tahan Halva*
Flax oil	*Selis zeti*
Mustard oil	*Горчичное масло*
Roasted sunflower seeds	*Smazhene nasinnya*

Roasted sunflower seeds

Roasted sunflower seeds (*Helianthus annuus* L.)

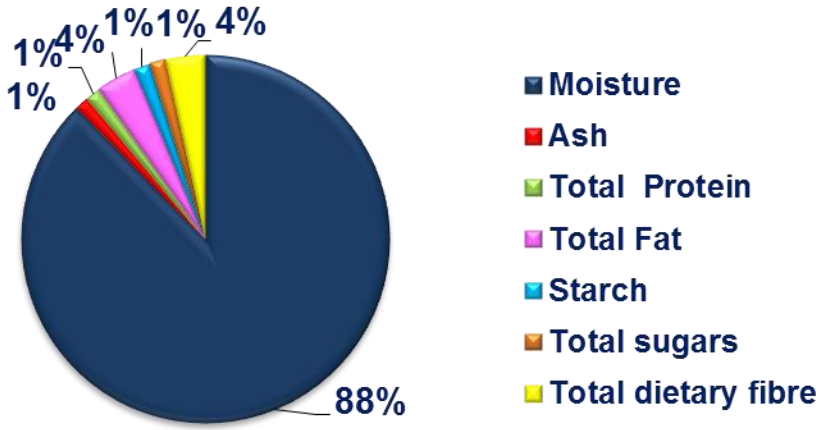


Herbs, spices and aromatic plants

Traditional Food (English name)	Traditional Food (National language)
Mursal tea	*Mursalski chai*
Wild plum sauce	*Tkhemlis satsebeli*
Herbal dish	*Mâncărică de verdeață*
Black tea	*Çay*
Pomazanka	*Pomazanka*

Herbal dish

Onions, green dill, green parsley, mint leaves, sweet basil leaves, sage leaves, tomato paste, peppers paste, sunflower oil, salt, black peppercorns, wheat flour

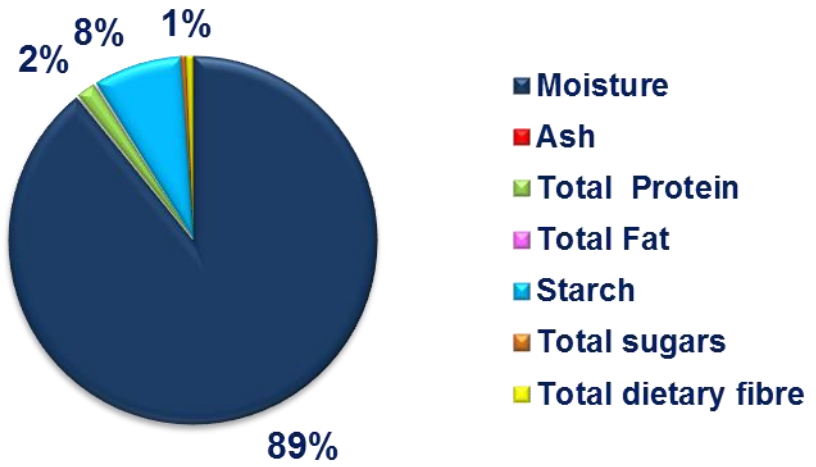


Low or non-alcoholic fermented products

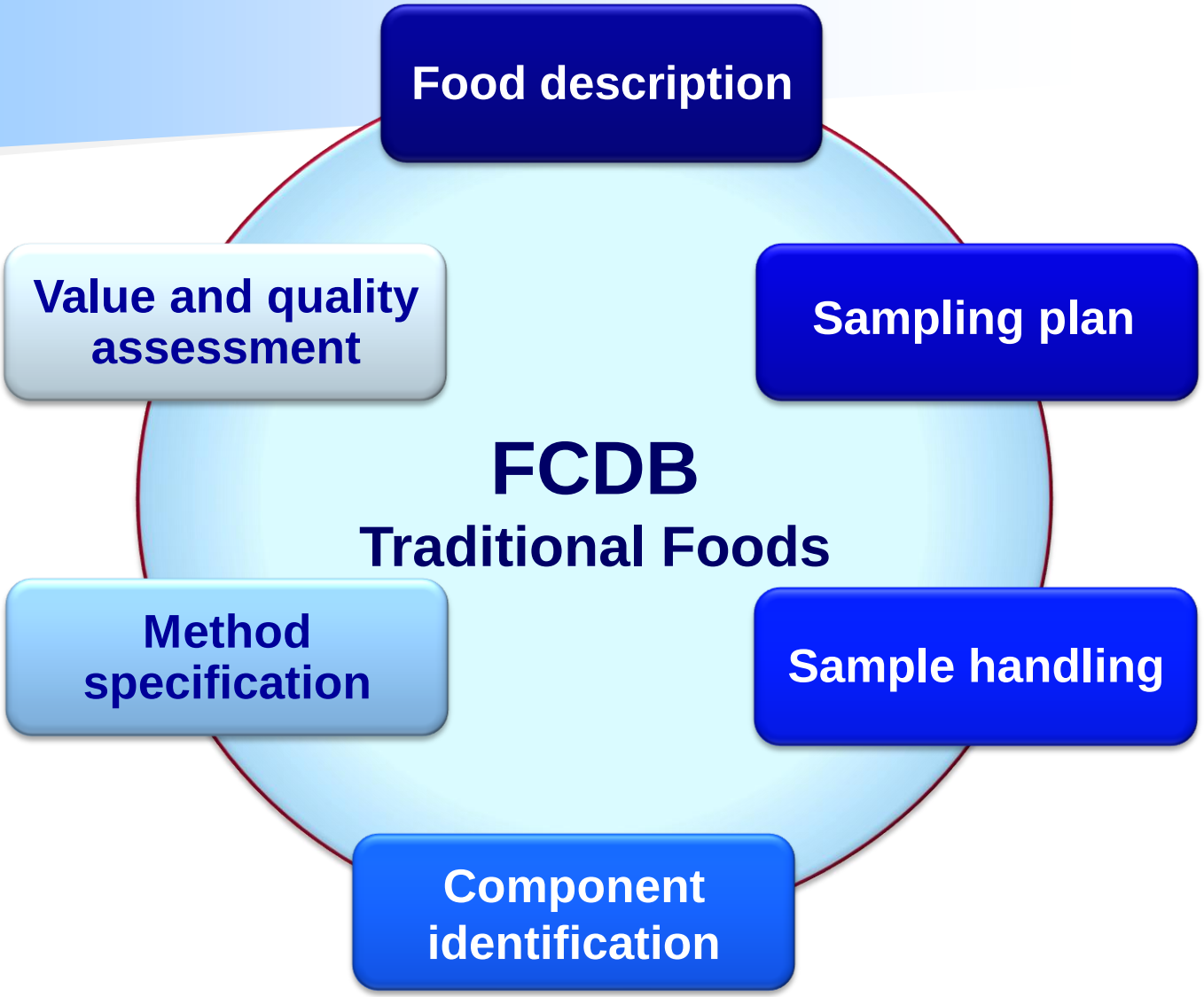
Traditional Food (English name)	Traditional Food (National language)
Millet ale	*Boza*
Elderberry soft drink	*Socata*
Kvass southern	*Квас южный*
Sautéed pickled green beans	*Fasulye turşusu kavurması*
Sauerkraut	*Капуста білокачанна квашена*

Millet ale

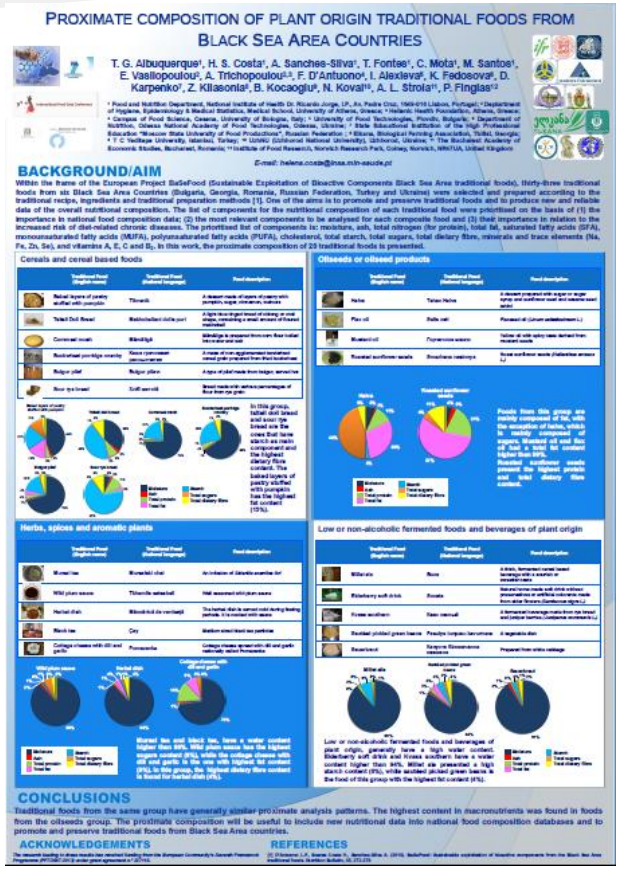
A thick, fermented cereal based beverage with a sourish or sweetish taste



Value documentation



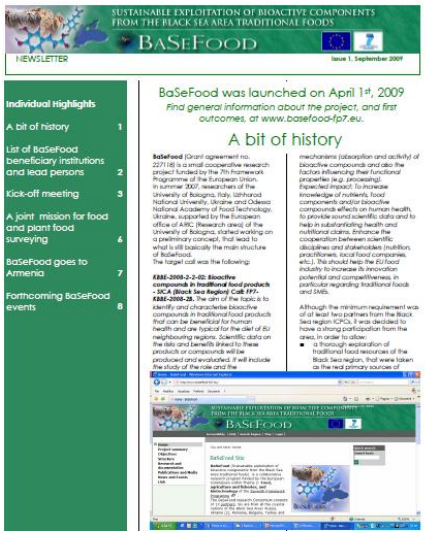
More analytical results

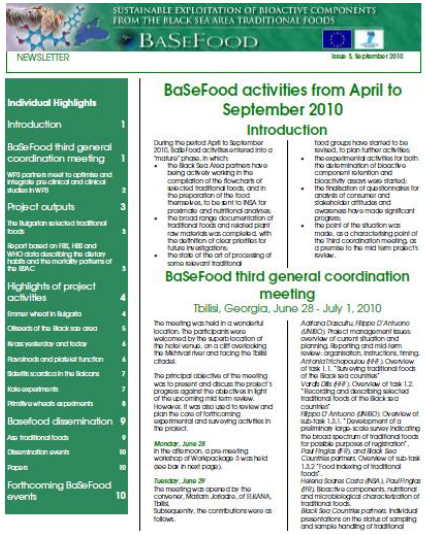


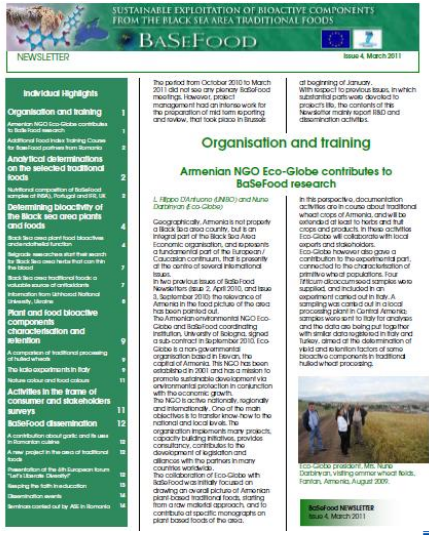
BaSeFood - Dissemination

http://www.basefood-fp7.eu/

Newsletters

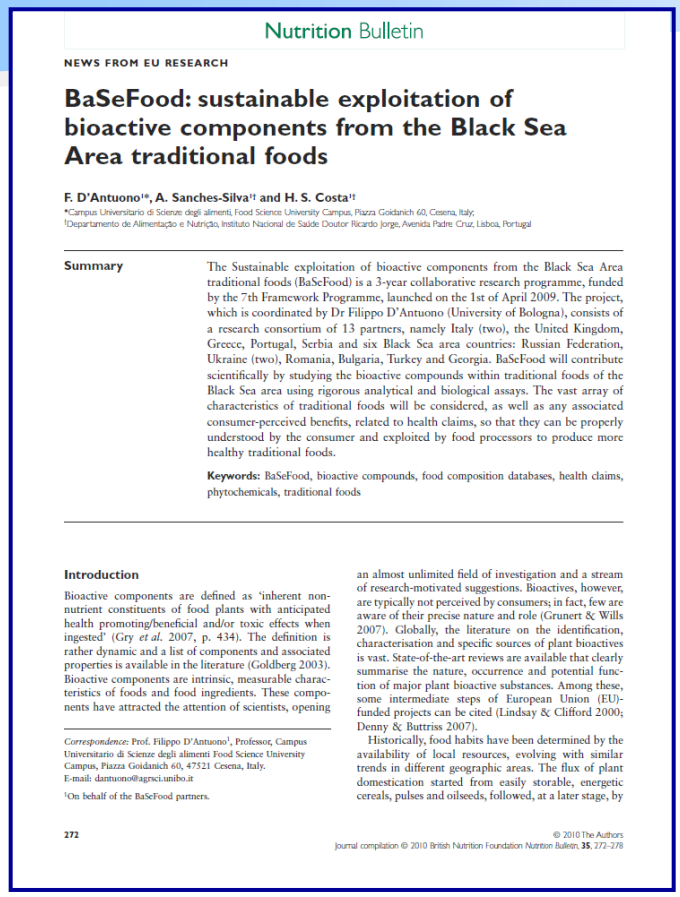






9th International Food Data Conference

Dissemination



Nutrition Bulletin

NEWS FROM EU RESEARCH

BaSeFood: sustainable exploitation of bioactive components from the Black Sea Area traditional foods

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Summary

The Sustainable exploitation of bioactive components from the Black Sea Area traditional foods (BaSeFood) is a 3-year collaborative research programme, funded by the 7th Framework Programme, launched on the 1st of April 2009. The project, which is coordinated by Dr Filippo D'Antuono (University of Bologna), consists of a research consortium of 13 partners, namely Italy (two), the United Kingdom, Greece, Portugal, Serbia and six Black Sea area countries: Russian Federation, Ukraine (two), Romania, Bulgaria, Turkey and Georgia. BaSeFood will contribute scientifically by studying the bioactive compounds within traditional foods of the Black Sea area using rigorous analytical and biological assays. The vast array of characteristics of traditional foods will be considered, as well as any associated consumer-perceived benefits, related to health claims, so that they can be properly understood by the consumer and exploited by food processors to produce more healthy traditional foods.

Keywords: BaSeFood, bioactive compounds, food composition databases, health claims, phytochemicals, traditional foods

Introduction

Bioactive components are defined as 'inherent non-nutrient constituents of food plants with anticipated health promoting/beneficial and/or toxic effects when ingested' (Gry *et al.* 2007, p. 434). The definition is rather dynamic and a list of components and associated properties is available in the literature (Goldberg 2003). Bioactive components are intrinsic, measurable characteristics of foods and food ingredients. These components have attracted the attention of scientists, opening an almost unlimited field of investigation and a stream of research-motivated suggestions. Bioactives, however, are typically not perceived by consumers; in fact, few are aware of their precise nature and role (Grunert & Wills 2007). Globally, the literature on the identification, characterisation and specific sources of plant bioactives is vast. State-of-the-art reviews are available that clearly summarise the nature, occurrence and potential function of major plant bioactive substances. Among these, some intermediate steps of European Union (EU)-funded projects can be cited (Lindsay & Clifford 2000; Denny & Buttriss 2007).

Historically, food habits have been determined by the availability of local resources, evolving with similar trends in different geographic areas. The flux of plant domestication started from easily storable, energetic cereals, pulses and oilseeds, followed, at a later stage, by

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[1]On behalf of the BaSeFood partners.

 Nutrition Bulletin, **35**, 272–278

IHC Lisboa 2010

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21–24 November 2010 · Munich · Germany

Ministério da Saúde
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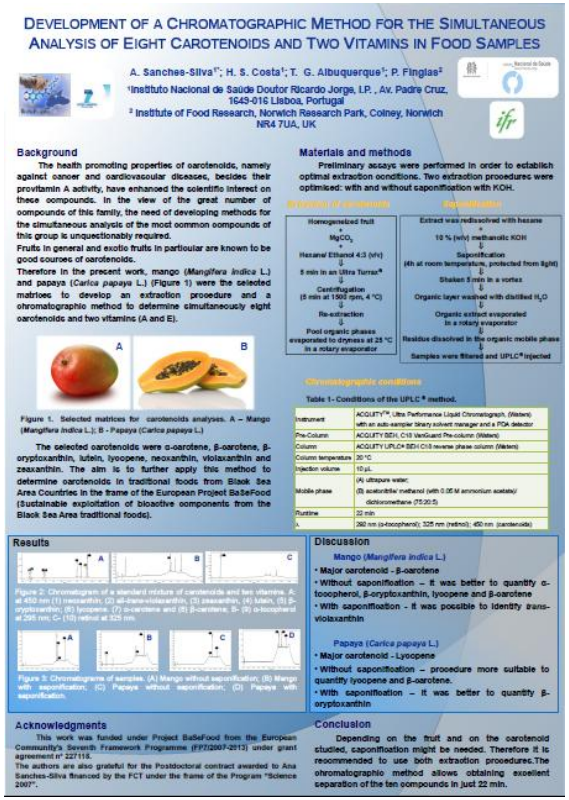
SEVENTH FRAMEWORK PROGRAMME

Dissemination



DEVELOPMENT OF A CHROMATOGRAPHIC METHOD FOR THE SIMULTANEOUS ANALYSIS OF EIGHT CAROTENOIDS AND TWO VITAMINS IN FOOD SAMPLES

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Background

The health promoting properties of carotenoids, namely against cancer and cardiovascular diseases, besides their provitamin A activity, have enhanced the scientific interest on these compounds. In the view of the great number of compounds of this family, the need of developing methods for the simultaneous analysis of the most common compounds of this group is unquestionably required.

Fruits in general and exotic fruits in particular are known to be good sources of carotenoids.

Therefore in the present work, mango (*Mangifera indica* L.) and papaya (*Carica papaya* L.) (Figure 1) were the selected matrices to develop an extraction procedure and a chromatographic method to determine simultaneously eight carotenoids and two vitamins (A and E).

Materials and methods

Preliminary assays were performed in order to establish optimal extraction conditions. Two extraction procedures were optimised: with and without saponification with KOH.

Extraction of carotenoids

Homogenized fruit → $MgCO_3$ → Hexane/ Ethanol 4:3 (v/v) → 5 min in an Ultra Turrax® → Centrifugation (5 min at 1500 rpm, 4 °C) → Re-extraction → Pool organic phases evaporated to dryness at 25 °C in a rotary evaporator

Saponification

Extract was redissolved with hexane → 10 % (w/v) methanolic KOH → Saponification (4h at room temperature, protected from light) → Shaken 5 min in a vortex → Organic layer washed with distilled H_2O → Organic extract evaporated in a rotary evaporator → Residue dissolved in the organic mobile phase → Samples were filtered and UPLC® injected

Figure 1. Selected matrices for carotenoids analyses. A – Mango (*Mangifera indica* L.); B - Papaya (*Carica papaya* L.)

The selected carotenoids were α-carotene, β-carotene, β-oryptoxanthin, lutein, lycopene, neoxanthin, violaxanthin and zeaxanthin. The aim is to further apply this method to determine carotenoids in traditional foods from Black Sea Area Countries in the frame of the European Project BaSeFood (Sustainable exploitation of bioactive components from the Black Sea Area traditional foods).

Chromatographic conditions

Table 1- Conditions of the UPLC ® method.

Instrument	ACQUITY®, Ultra Performance Liquid Chromatograph, (Waters) with an auto-sampler library solvent manager and a PDA detector
Pre-Column	ACQUITY BEH, C18 VanGuard Pre-column (Waters)
Column	ACQUITY UPLC® BEH C18 reverse phase column (Waters)
Column temperature	20 °C
Injection volume	10 µL
Mobile phase	(A) ultrapure water; (B) acetonitrile/ methanol (with 0.05 M ammonium acetate)/ dichloromethane (75:20:5)
Runtime	20 min
λ	292 nm (α-tocopherol); 325 nm (retinol); 450 nm (carotenoids)

Results

Figure 2. Chromatogram of a standard mixture of carotenoids and two vitamins. A- at 450 nm (1) neoxanthin; (2) all-trans-violaxanthin; (3) zeaxanthin; (4) lutein; (5) β-cryptoxanthin; (6) lycopene; (7) α-carotene and (8) β-carotene; B- (9) α-tocopherol at 295 nm; C- (10) retinol at 325 nm.

Figure 3. Chromatograms of samples. (A) Mango without saponification; (B) Mango with saponification; (C) Papaya without saponification; (D) Papaya with saponification.

Discussion

Mango (*Mangifera indica* L.)

- Major carotenoid - β-carotene
- Without saponification – it was better to quantify α-tocopherol, β-oryptoxanthin, lycopene and β-carotene
- With saponification - it was possible to identify *trans*-violaxanthin

Papaya (*Carica papaya* L.)

- Major carotenoid - Lycopene
- Without saponification – procedure more suitable to quantify lycopene and β-carotene.
- With saponification – it was better to quantify β-oryptoxanthin

Conclusion

Depending on the fruit and on the carotenoid studied, saponification might be needed. Therefore it is recommended to use both extraction procedures.The chromatographic method allows obtaining excellent separation of the ten compounds in just 22 min.

Acknowledgments

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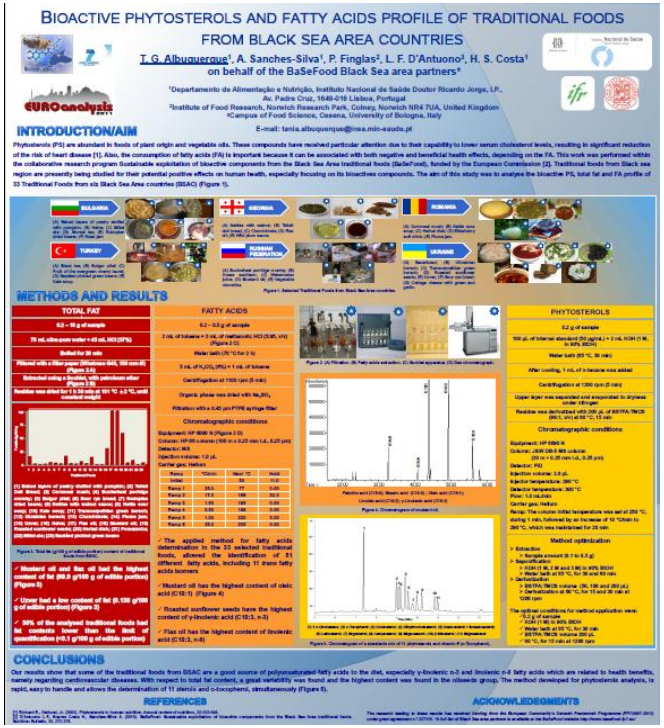

BIOACTIVE PHYTOSTEROLS AND FATTY ACIDS PROFILE OF TRADITIONAL FOODS FROM BLACK SEA AREA COUNTRIES

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INTRODUCTION/AIM

Phytosterols (PS) are abundant in foods of plant origin and vegetable oils. These compounds have received particular attention due to their capability to lower serum cholesterol levels, resulting in significant reduction of the risk of heart disease [1]. Also, the consumption of fatty acids (FA) is important because it can be associated with both negative and beneficial health effects, depending on the FA. This work was performed within the collaborative research program Sustainable exploitation of bioactive components from the Black Sea Area traditional foods (BaSeFood), funded by the European Commission [2]. Traditional foods from Black sea region are presently being studied for their potential positive effects on human health, especially focusing on its bioactives compounds. The aim of this study was to analyse the bioactive PS, total fat and FA profile of 33 Traditional Foods from six Black Sea Area countries (BSAC) (Figure 1).

Figure 1. Selected Traditional Foods from Black Sea Area countries.

METHODS AND RESULTS

TOTAL FAT

0.2 – 10 g of sample → 70 mL ultra-pure water + 65 mL HCl (37%) → Refluxed for 30 min → Filtered with a filter paper (Whatman 541, 150 mm Ø) (Figure 2.b) → Extracted using 3 fractions, with petroleum ether (Figure 2.c) → Residue was dried for 1 h 30 min at 101 °C ± 5 °C, until constant weight

FATTY ACIDS

0.2 – 0.5 g of sample → 2 mL of toluene + 2 mL of methanolic HCl (5.6N, v/v) (Figure 2.d) → Water bath (70 °C) for 2 h → 3 mL of H_2O_2 (6%) + 1 mL of toluene → Centrifugation at 1500 rpm (5 min) → Organic phase was dried with Na_2SO_4 → Filtration with a 0.45 µm PTFE syringe filter

Chromatographic conditions

Replacement: HP 6890 N (Figure 2.f)
Column: HP-88 column (100 m x 0.25 mm i.d., 0.25 µm)
Detector: MS
Injection volume: 1.0 µL
Carrier gas: Helium

PHYTOSTEROLS

0.2 g of sample → 100 µL of Internal standard (5α-cholestane) + 2 mL KOH (1 M, in 90% EtOH) → Water bath (85 °C, 30 min) → After cooling, 1 mL of n-hexane was added → Centrifugation at 1300 rpm (5 min) → Upper layer was separated and evaporated to dryness under nitrogen → Residue was derivatized with 200 µL of BSTFA:TMCS (99:1, v/v) at 60 °C, 15 min

Chromatographic conditions

Replacement: HP 6890 N
Column: …(90 m x 0.25 mm i.d., 0.25 µm)
Detector: FID
Injector temperature: 250 °C
Detector temperature: 300 °C
Flow: 1.3 mL/min
Carrier gas: Helium
Ramp: The column initial temperature was set at 250 °C, then it was increased at a rate of 10 °C/min to 290 °C, which was maintained for 25 min.

Method optimization

- Extraction
  - Sample amount (0.1 to 0.5 g)
- Saponification
  - KOH (1 M, 2 M and 3 M) in 90% EtOH
  - Water bath at 65 °C, for 30 and 60 min
- Derivatization
  - BSTFA:TMCS volume (50, 100 and 200 µL)
  - Derivatization at 60 °C, for 15 and 30 min at 1200 rpm

The optimal conditions for method application were:
- 0.2 g of sample
- KOH (1 M) in 90% EtOH
- Water bath at 65 °C, for 30 min
- BSTFA:TMCS volume 200 µL
- 60 °C, for 15 min at 1200 rpm

Figure 2. Chromatograms of: (a) Fatty acids extraction; (b) Sample preparation; (c) Fat extraction; (d) Fatty acids derivatization; (e) Phytosterols derivatization; (f) Chromatographic system.

Figure 3. Chromatogram of a standard mix of (1) phytosterols and vitamin E (α-Tocopherol).

CONCLUSIONS

Our results show that some of the traditional foods from BSAC are a good source of polyunsaturated fatty acids to the diet, especially γ-linolenic n-3 and linolenic n-6 fatty acids which are related to health benefits, namely regarding cardiovascular diseases. With respect to total fat content, a great variability was found and the highest content was found in the oilseeds group. The method developed for phytosterols analysis, is rapid, easy to handle and allows the determination of 11 sterols and cis-conjugated, simultaneously (Figure 6).

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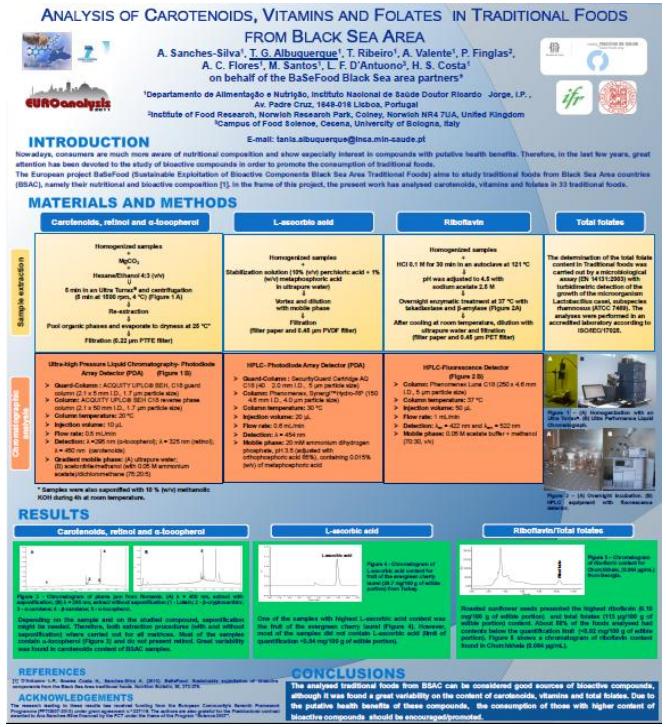

ANALYSIS OF CAROTENOIDS, VITAMINS AND FOLATES IN TRADITIONAL FOODS FROM BLACK SEA AREA

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INTRODUCTION

Nowadays, consumers are much more aware of nutritional composition and show especially interest in compounds with putative health benefits. Therefore, in the last few years, great attention has been devoted to the study of bioactive compounds in order to promote the consumption of traditional foods.

The European project BaSeFood (Sustainable Exploitation of Bioactive Components Black Sea Area Traditional Foods) aims to study traditional foods from Black Sea Area countries (BSAC), namely their nutritional and bioactive composition [1]. In the frame of this project, the present work has analysed carotenoids, vitamins and folates in 33 traditional foods.

MATERIALS AND METHODS

	Carotenoids, retinol and α-tocopherol	L-ascorbic acid	Riboflavin	Total folates
Sample extraction	Homogenized samples → $MgCO_3$ → Hexane/Ethanol 4:3 (v/v) → 6 min in an Ultra Turrax® and centrifugation (5 min at 1500 rpm, 4 °C) (Figure 1.A) → Re-extraction → Pool organic phases and evaporate to dryness at 28 °C → Filtration (0.22 µm PTFE filter)	Homogenized samples → Stabilization solution (10% (v/v) perchloric acid + 1% (w/v) metaphosphoric acid in ultrapure water) → Vortex and dilution with mobile phase → Filtration (filter paper and 0.45 µm PVDF filter)	Homogenized samples → HCl 0.1 M for 30 min in an autoclave at 121 °C → pH was adjusted to 4.5 with sodium acetate 2.5 M → Overnight enzymatic treatment at 37 °C with takadiastase and β-amylase (Figure 2A) → After cooling at room temperature, dilution with ultrapure water and filtration (filter paper and 0.45 µm PET filter)	The determination of the total folate content in Traditional foods was carried out by a microbiological assay (EN 14131:2003) with turbidimetric detection of the growth of the microorganism Lactobacillus casei, subspecies rhamnosus (ATCC 7469). The analyses were performed in an accredited laboratory according to ISO/IEC17025.
Chromatographic separation	Ultra-high Pressure Liquid Chromatography- Photodiode Array Detector (PDA) (Figure 1.B) → Guard-Column : ACQUITY UPLC® BEH, C18 guard column (2.1 x 5 mm I.D., 1.7 µm particle size) → Column: ACQUITY UPLC® BEH C18 reverse phase column (2.1 x 50 mm I.D., 1.7 µm particle size) → Column temperature: 20°C → Injection volume: 10 µL → Flow rate: 0.6 mL/min → Detection: λ =295 nm (α-tocopherol); λ = 325 nm (retinol), λ = 450 nm (carotenoids) → Gradient mobile phase: (A) ultrapure water; (B) acetonitrile/methanol (with 0.05 M ammonium acetate)/dichloromethane (75:20:5)	HPLC- Photodiode Array Detector (PDA) → Guard-Column : SecurityGuard Cartridge AQ C18 (4Ø 2.0 mm I.D., 5 µm particle size) → Column: Phenomenex, Synergi™ Hydro-RP (150 4.6 mm I.D., 4.0 µm particle size) → Column temperature: 30 °C → Injection volume: 20 µL → Flow rate: 0.6 mL/min → Detection: λ = 454 nm → Mobile phase: 20 mM ammonium dihydrogen phosphate, pH 3.5 (adjusted with orthophosphoric acid 85%), containing 0.015% (w/v) of metaphosphoric acid	HPLC-Fluorescence Detector (Figure 2.B) → Column: Phenomenex Luna C18 (250 x 4.6 mm I.D., 5 µm particle size) → Column temperature: 37 °C → Injection volume: 50 µL → Flow rate: 1 mL/min → Detection: λ_{ex} = 422 nm and λ_{em} = 522 nm → Mobile phase: 0.05 M acetate buffer + methanol (70:30, v/v)	

* Samples were also saponified with 10 % (w/v) methanolic KOH during 4h at room temperature.

Figure 1 – (A) Homogenization with an Ultra Turrax®; (B) Ultra Performance Liquid Chromatograph.

Figure 2 – (A) Overnight incubation; (B) HPLC equipment with fluorescence detector.

RESULTS

Carotenoids, retinol and α-tocopherol

Figure 3 – Chromatogram of plasma pool from Romania. UV: λ = 450 nm, extract with saponification; (B) λ = 295 nm, extract without saponification (1) Lutein; 2 - β-cryptoxanthin; 3 – α-carotene; 4 - β-carotene; 5 – α-tocopherol.

Depending on the sample and on the studied compound, saponification might be needed. Therefore, both extraction procedures (with and without saponification) where carried out for all matrices. Most of the samples contain α-tocopherol (Figure 3) and do not present retinol. Great variability was found in carotenoids content of BSAC samples.

L-ascorbic acid

Figure 4 – Chromatogram of L-ascorbic acid in one of the analysed samples (1.7 mg/100 g of edible portion) from Turkey.

One of the samples with highest L-ascorbic acid content was the fruit of the evergreen cherry laurel (Figure 4). However, most of the samples did not contain L-ascorbic acid (limit of quantification =0.94 mg/100 g of edible portion).

Riboflavin/Total folates

Figure 5 – Chromatogram of riboflavin content in Chanterelles (0.066 µg/mL) from Georgia.

Roasted sunflower seeds presented the highest riboflavin (0.10 mg/100 g of edible portion) and total folates (113 µg/100 g of edible portion) content. About 50% of the foods analysed had contents below the quantification limit (<0.02 mg/100 g of edible portion). Figure 5 shows a chromatogram of riboflavin content found in Chanterelles (0.066 µg/mL).

CONCLUSIONS

The analysed traditional foods from BSAC can be considered good sources of bioactive compounds, although it was found a great variability on the content of carotenoids, vitamins and total folates. Due to the putative health benefits of these compounds, the consumption of those with higher content of bioactive compounds should be encouraged/promoted.

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Output and benefits

WP2

- Enhanced knowledge of traditional foods composition of Black Sea area countries
- Harmonized procedures to continue to update national food composition databases
- Nutritional composition data for successful promotion of traditional foods
- Development and economic sustainability of rural areas
- To promote local biodiversity and sustainable diets by maintaining healthy dietary patterns

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