Nutritional data on traditional foods and plant raw materials

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BaSeFood Project

WP 2 - Bioactive compounds, nutritional and microbiological characterization of traditional foods
WP Leaders – INSA/IFR
Overall Objective: Health claims for selected traditional foods in the Black Sea Area by producing data for chemical and microbiological characterization of selected foods

• To establish a priority list of bioactive compounds with putative health benefits
• To identify laboratories, allocate specific analytical tasks, and to select validated methods of analysis
• To provide new validated data on nutritional composition and selected range of bioactive compounds of traditional foods
• To identify and quantify key microorganisms present through the food processing chain in selected traditional foods, and their influence on the quality and safety
Black Sea Area Countries (BSAC)

WP1 - Prioritisation of Traditional Foods

- Cereal or cereal based foods
- Fruit or fruit based foods
- Vegetable or vegetable based foods
- Herbs, spices and aromatic plants
- Low or non-alcoholic fermented products
- Oilseeds or oilseed products
Collect representative food samples

Collect samples from the geographical area of origin

The same recipe must be used in case of composite foods

Food preparation (composite foods) or ripening (primary foods) should be carried out at different time periods
# Sampling plan and sample handling

<table>
<thead>
<tr>
<th>SAMPLING PLAN</th>
<th>SELECTED TRADITIONAL FOODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAMPLE HANDLING</td>
<td>Proximates</td>
</tr>
<tr>
<td>TRANSPORT TO LOCAL LABORATORIES</td>
<td></td>
</tr>
<tr>
<td>• Temperature</td>
<td></td>
</tr>
<tr>
<td>• Containers</td>
<td></td>
</tr>
<tr>
<td>POOL SIZE</td>
<td>± 2 Kg - from 10 samples of primary foods or 6 samples for composite foods</td>
</tr>
<tr>
<td>HOMOGENEIZATION</td>
<td>Mixer (eg. Grindomix™)</td>
</tr>
<tr>
<td>STABILIZATION</td>
<td>---</td>
</tr>
<tr>
<td>STORAGE</td>
<td></td>
</tr>
<tr>
<td>• Temperature</td>
<td></td>
</tr>
<tr>
<td>• Time</td>
<td></td>
</tr>
<tr>
<td>• Containers</td>
<td></td>
</tr>
<tr>
<td>TRANSPORT TO LABORATORIES FOR ANALYSIS</td>
<td></td>
</tr>
<tr>
<td>• Temperature</td>
<td></td>
</tr>
<tr>
<td>• Time</td>
<td></td>
</tr>
<tr>
<td>• Containers</td>
<td>Opaque bags vacuum sealed</td>
</tr>
<tr>
<td>SAMPLE SIZE</td>
<td>450 g</td>
</tr>
<tr>
<td></td>
<td>40 g</td>
</tr>
<tr>
<td></td>
<td>170 g</td>
</tr>
<tr>
<td>STORAGE</td>
<td></td>
</tr>
<tr>
<td>• Temperature</td>
<td></td>
</tr>
<tr>
<td>• Time</td>
<td>11 months</td>
</tr>
<tr>
<td>DEFROST THE SAMPLES AT ROOM TEMPERATURE</td>
<td></td>
</tr>
<tr>
<td>ANALYSIS OF SAMPLES IN TRIPlicate</td>
<td></td>
</tr>
</tbody>
</table>
# 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

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximates</td>
<td>Moisture, ash, total nitrogen (for protein), total fat (individual fatty acids), dietary fibre, total sugars and starch</td>
</tr>
<tr>
<td>Vitamins</td>
<td>Vitamin A (all-trans-retinol), vitamin C, vitamin E (α-tocopherol) and vitamin B$_2$ (riboflavin), total folate</td>
</tr>
<tr>
<td>Minerals</td>
<td>Sodium, iron, potassium, calcium, magnesium, phosphorus, iron, zinc, selenium and manganese</td>
</tr>
<tr>
<td>Bioactive compounds</td>
<td>Phenolics, glucosinolates and carotenoids</td>
</tr>
</tbody>
</table>
Selection of laboratories

According to quality requirements

Components

Accredited laboratories

INSA, IFR

Laboratories participating in Proficiency Testing schemes

IFR, UNIBO

Bioactive compounds

Laboratories that have expertise in quantifying these compounds
Nutritional composition of 33 Traditional Foods
Cereal or cereal based foods

**Tsiteli doli bread**

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

**Baked layers of pastry stuffed with pumpkin**

A dessert made of layers of pastry with pumpkin, sugar, cinnamon and walnuts

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**Cereal or cereal based foods**

- **Tsiteli doli bread**
  - Energy: 996 kJ (238 kcal)
  - Moisture: 30.1%
  - Ash: 2.5%
  - Total protein: 6.8%
  - Total fat: 4.6%
  - Available carbohydrates: 35.8%
  - Total dietary fibre: 1.7%

- **Baked layers of pastry stuffed with pumpkin**
  - Energy: 1219 kJ (292 kcal)
  - Moisture: 43.3%
  - Ash: 1.5%
  - Total protein: 4.7%
  - Total fat: 33.0%
  - Available carbohydrates: 30.1%
  - Total dietary fibre: 2.4%
Vegetable or vegetable based foods

**Transcarpathian green borsch**

A thick vegetable soup with sorrel

Energy: 181 kJ (43 kcal)

- Moisture: 89.8%
- Ash: 0.2%
- Total protein: 1.1%
- Total fat: 1.2%
- Available carbohydrates: 2.0%
- Total dietary fibre: 5.5%

**Vegetable okroshka**

A cold soup with shredded vegetables and bread kvass

Energy: 132 kJ (32 kcal)

- Moisture: 91.9%
- Ash: 0.4%
- Total protein: 0.2%
- Total fat: 7.5%
- Available carbohydrates: 30.1%
- Total dietary fibre: 20.1%
**Fruit or fruit based foods**

**Churchkhela**
A delicacy made of walnuts sewn onto a string, dipped in thickened grape juice and dried in the shape of a sausage.

**Plums jam**
A traditional plum paste, obtained by boiling the plums without sugar.

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**Churchkhela**

- Energy: 1632 kJ (390 kcal)
- SFA: 1.2
- MUFA: 2.5
- PUFA: 9.4

**Plums jam**

- Energy: 732 kJ (175 kcal)
- SFA: 2.8
- MUFA: 5.5
- PUFA: 11.0

**Nutrient Information**

- Moisture
- Ash
- Total protein
- Total fat
- Available carbohydrates
- Total dietary fibre

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**Chemical Composition**

<table>
<thead>
<tr>
<th>Component</th>
<th>Churchkhela</th>
<th>Plums jam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>53.4</td>
<td>53.4</td>
</tr>
<tr>
<td>Ash</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Total protein</td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Total fat</td>
<td>1.5</td>
<td>4.6</td>
</tr>
<tr>
<td>Available carbs</td>
<td>6.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Total fibre</td>
<td>13.7</td>
<td>11.0</td>
</tr>
</tbody>
</table>

**Chemical Composition (100 g)**

- Energy: 1632 kJ (390 kcal) for Churchkhela, 732 kJ (175 kcal) for Plums jam.
- Saturated fatty acids (SFA): 1.2 for Churchkhela, 2.8 for Plums jam.
- Monounsaturated fatty acids (MUFA): 2.5 for Churchkhela, 5.5 for Plums jam.
- Polyunsaturated fatty acids (PUFA): 9.4 for Churchkhela, 11.0 for Plums jam.
- Moisture: 53.4% for both, Ash: 1.4% for both, Total protein: 1.3% for Churchkhela, 1.2% for Plums jam, Total fat: 1.5% for Churchkhela, 4.6% for Plums jam, Available carbohydrates: 6.6% for Churchkhela, 5.5% for Plums jam, Total dietary fibre: 13.7% for Churchkhela, 11.0% for Plums jam.
Oilseeds or oilseed products

A dessert prepared with sugar or sugar syrup and sunflower seeds *tahini*

**Halva**

Roasted sunflower seeds

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**Energy** 2150 kJ (514 kcal)

- **SFA** – Saturated Fatty Acids: 0.8
- **MUFA** – Monounsaturated Fatty Acids: 7.9
- **PUFA** – Polyunsaturated Fatty Acids: 19.9

**Moisture**: 4.6 g

**Ash**: 11.0 g

**Total protein**: 11.0 g

**Total fat**: 30.1 g

**Available carbohydrates**: 6.03 g

**Total dietary fibre**: 1.2 g

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**Energy** 2675 kJ (640 kcal)

- **SFA** – Saturated Fatty Acids: 6.03
- **MUFA** – Monounsaturated Fatty Acids: 10.6
- **PUFA** – Polyunsaturated Fatty Acids: 38.8

**Moisture**: 4.6 g

**Ash**: 11.3 g

**Total protein**: 3.9 g

**Total fat**: 20.8 g

**Available carbohydrates**: 3.9 g

**Total dietary fibre**: 3.3 g
Herbs, spices and aromatic plants

Wild plum sauce

A well-seasoned wild plum sauce

Herbal dish

A delicious spring broth with green herb leaves

Energy 193 kJ (46 kcal)

<table>
<thead>
<tr>
<th></th>
<th>g/100 g of edible portion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>9.3</td>
</tr>
<tr>
<td>Ash</td>
<td>0.2</td>
</tr>
<tr>
<td>Total protein</td>
<td>0.7</td>
</tr>
<tr>
<td>Total fat</td>
<td>1.2</td>
</tr>
<tr>
<td>Available carbohydrates</td>
<td>5.5</td>
</tr>
<tr>
<td>Total dietary fibre</td>
<td>11.0</td>
</tr>
</tbody>
</table>

Energy 220 kJ (53 kcal)

<table>
<thead>
<tr>
<th></th>
<th>g/100 g of edible portion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>8.5</td>
</tr>
<tr>
<td>Ash</td>
<td>1.4</td>
</tr>
<tr>
<td>Total protein</td>
<td>1.2</td>
</tr>
<tr>
<td>Total fat</td>
<td>4.6</td>
</tr>
<tr>
<td>Available carbohydrates</td>
<td>3.6</td>
</tr>
<tr>
<td>Total dietary fibre</td>
<td>11.0</td>
</tr>
</tbody>
</table>
Low or non-alcoholic fermented products

Sautéed pickled green beans
A vegetable dish with rice

Sauerkraut
Finely shredded white cabbage - fermented

Energy 281 kJ (67 kcal)

<table>
<thead>
<tr>
<th>Protein</th>
<th>Fat</th>
<th>Carbohydrates</th>
<th>Dietary fibre</th>
<th>Moisture</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3</td>
<td>0.8</td>
<td>4.8</td>
<td>4.6</td>
<td>85.4</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Energy 99 kJ (24 kcal)

<table>
<thead>
<tr>
<th>Protein</th>
<th>Fat</th>
<th>Carbohydrates</th>
<th>Dietary fibre</th>
<th>Moisture</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>1.7</td>
<td>3.8</td>
<td>4.6</td>
<td>91.3</td>
<td>0.9</td>
</tr>
</tbody>
</table>
The two foods with highest levels of total folate were roasted sunflower seeds and nettles with walnut sauce.
The highest α-tocopherol value was found for roasted sunflower seeds, followed by churchkhela and plums jam.
Roasted sunflower seeds presented the highest riboflavin concentration followed by baked layers of pastry stuffed with pumpkin, and halva.
The highest ascorbic acid value was found for fruits of the evergreen cherry laurel (29.9 mg/100 g of edible portion).
Sodium (Na)

Three of the analysed foods presented Na content higher than 500 mg/100 g, which were herbal dish, wild plum sauce and tsiteli doli bread.
Potassium (K)

- Baked layers of pastry stuffed with pumpkin
- Tsiteli Doli Bread
- Buckwheat porridge crumbly
- Bulgur pilaf
- Sour rye bread
- Bulgar pilaf
- Buckwheat porridge crumbly
- Tseteli Doli Bread
- Nettles with walnut sauce
- Nettle sour soup
- Rodopian dried beans
- Wild plum sauce
- Herbal dish
- Cottage cheese with dill and garlic
- Millet ale
- Sauteed pickled green beans
- Sauerkraut
- Uzvar
- Fruit of the evergreen cherry laurel
- Watermelon juice
- Plums jam
- Churchkhela
- Ukrainan borsch
- Transcarpathian green borsch
- Kale soup
- Vegetable okroshka
- Nettle sour soup
- Nettles with walnut sauce
- Sour rye bread
- Bulgur pilaf
- Buckwheat porridge crumbly
- Tseteli Doli Bread
- Baked layers of pastry stuffed with pumpkin
- Halva
- Uzvar
The highest phosphorus content (681 ± 7.94 mg/100 g) was found in roasted sunflower seeds followed by tsiteli doli bread.
Nettles with walnut sauce was the sample with the highest iron content followed by roasted sunflower seeds.
From the 33 analysed traditional foods, zinc was found in 39% of them and the richest source was roasted sunflower seeds.
The sample with highest β-carotene content was plums jam followed by kale soup and nettles sour soup.
The foods with highest lycopene content were watermelon juice, sautéed pickled green beans and Ukrainian borsch.
Wild plum sauce was the sample that presented the highest β-cryptoxanthin content (63.8 µg/100 g of edible portion).
The highest level was found for rodopian dried beans, followed by vegetable okroshka and nettle sour soup.
The samples that presented the highest total polyphenol content were halva and roasted sunflower seeds.
More analytical results
More analytical results
Dissemination

Nutrition Bulletin

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 8th Framework Programme, launched on the 1st of April 2009. The project, which is coordinated by Dr Filippo D’Antone (University of Bologna), consists of a research consortium of 13 partners, namely Italy (2), the United Kingdom, Greece, Portugal, Serbia and six Black Sea area countries: Russian Federation, Ukraine (2), Romania, Bulgaria, Turkey and Georgia. BaSeFood will contribute scientifically by studying the bioactive compounds within traditional foods of the Black Sea area using rigorous experimental and biological assays. The vast array of characteristics of traditional foods will be considered, as well as any associated consumer-preferred features, 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 database, health claims, phytochemicals, traditional foods

Introduction
Bioactive components are defined as “beneficial non-nutrient constituents of foods that can interact with physiological systems in a manner that determines, modifies or prevents the occurrence of disease” (F contrast). Bioactive, however, are typically not perceived by consumers, as they are not aware of their health-promoting effect on their overall health. The identification, characterisation and functional properties of bioactive compounds are of great interest to food processors and consumers alike. The rationale behind this is to use natural products to improve the health benefits of food. The BaSeFood project is focusing on the identification, characterisation and functional properties of bioactive compounds in traditional foods of the Black Sea area. The project aims to identify and characterise the bioactive compounds in traditional foods and to understand their role in health promoting effects. The project also aims to develop new food products containing these bioactive compounds with potential health benefits.

Conclusions
The BaSeFood project will provide valuable information on the health benefits of traditional foods from the Black Sea area. The project will also contribute to the development of new healthy food products, which will be beneficial for the health of the consumers.

Acknowledgements
The BaSeFood project is funded by the 8th Framework Programme of the European Union.

References

Correspondence: Dr Filippo D’Antone, University of Portsmouth, Department of Natural Sciences, Portsmouth, PO1 3RE, UK.
Email: f.dantone@ports.ac.uk

Tânia González Álvarez, Ana Sanches-Silva
National Health Institute (INSA), Food and Nutrition Department, Portugal
Value documentation

FCDB
Traditional Foods

- Food description
- Sampling plan
- Value and quality assessment
- Sample handling
- Method specification
- Component identification
Output and benefits

- 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
1. Alma Mater Studiorum – Università di Bologna (UNIBO), Italy – Coordinator
2. Institute of Food Research (IFR), United Kingdom
3. Hellenic Health Foundation (HHF), Greece
4. Instituto Nacional de Saúde Doutor Ricardo Jorge (INSA), Portugal
5. Odessa National Academy of Food Technologies (ONAFT), Ukraine
6. Uzhhorod National University (UZHNU), Ukraine
7. State Educational Institution of the High Professional Education “Moscow State University of Food Productions” (MSUFP), Russian Federation
8. Spread European Safety – European Economic Interest Grouping (SPES-GEIE), Italy
9. Bucharest University of Economics (ASE), Romania
10. Biological Farming Association – Elkana (ELKANA), Georgia
11. Institute of Medical Research (IMR), Serbia
12. University of Food Technologies (UFT), Bulgaria
13. T C Yeditepe University (YEDITEPE), Turkey
THANK YOU!